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Multilateral Defence Cooperation in the Euro-Atlantic Region 1992 – 2016:

A Game-Theoretic Analysis of NATO's Deterrence and Defence Posture

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Multilateral Defence Cooperation in the Euro-Atlantic Region 1992 – 2016:

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List of abbreviations

Abbreviation	***Long form***
ABM	Anti-Ballistic Missile
ALCM	Air-Launched Cruise Missile
BMD	Ballistic Missile Defence
CFE	Conventional Forces in Europe (treaty)
CJTF	Combined Joint Task Force (NATO)
DCI	Defence Capabilities Initiative (NATO)
EPAA	European Phased Adaptive Approach
ICBM	Intercontinental Ballistic Missile
INF	Treaty on the Elimination of Intermediate-Range and Shorter-Range Missiles
LoA	Level of Ambition
MAD	Mutually Assured Destruction
MB	Military Balance (annual handbook)
NAC	North Atlantic Council
NCS	NATO Command Structure
NFS	NATO Force Structure
NPT	Non-Proliferation of Nuclear Weapons Treaty
NRF	NATO Response Force
PBE	Perfect Bayesian Equilibrium
PCC	Prague Capabilities Commitment (NATO)
PDT	Perfect Deterrence Theory
PfP	Partnership for Peace (NATO programme)
rDMC	Distribution of Military Capabilities (database)
SLBM	Submarine-Launched Ballistic Missile
SORT	Strategic Offensive Reductions Treaty
SRBM	Short-Range Ballistic Missile
START	Strategic Arms Reduction Treaty
TMD	Theatre Ballistic Missile Defence
WMD	Weapons of Mass Destruction

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Chapter 1: Introduction

1.1 Background

If a professor of history or political science were to ask students what has been the most important connection between the U.S. and (Western) Europe in the second half of the 20th century, those students that might be the most knowledgeable of that period of time and geographic area could boldly declare that it had been North Atlantic Treaty Organisation (NATO) that constituted the decisive factor for the strength of the transatlantic relationship. The professor might applaud such a response and continue by providing a brief historic lecture on how NATO was founded in 1949 as a defensive military alliance by twelve original founding members that pledged to defend each other – in accordance with Article 5 of the North Atlantic Treaty[1] – in case that any one of the member states comes under attack by any outside military power. In the Cold War, this outside military power meant first of all the Soviet Union and since 1955 the socialist bloc's military alliance based on the Treaty of Friendship, Cooperation and Mutual Assistance *also known as* Warsaw Pact.

The politico-military and institutional evolution of the transatlantic alliance throughout the Cold War was decisively shaped by the bloc confrontation with the USSR and its own military alliance, the Warsaw Pact. In that regard, NATO had only one central task from its inception in 1949 till the end of the Cold War in 1991: To deter an attack from the Warsaw Pact and to defend NATO territory by any means necessary, including the use of nuclear weapons in case that deterrence fails. For this purpose, NATO's member states have continuously worked on the alliance's strategic concept as the key document, which provided the highest-level political guidance for defining the requirements of NATO's deterrence and defence posture. Within the remit of the strategic concepts' development, military doctrines like the 'massive retaliation' from the 1950s, wherein U.S. as primary nuclear-armed member state responds with nuclear force against any attack, or the 'flexible response' of the 1960s that established a layered reciprocal response by the U.S./NATO in case of Soviet/Warsaw Pact military aggression, became central building block for the credibility of NATO's deterrence and defence posture.[2]

From a foreign-, security-, and defence policy-maker's point of view, NATO's deterrence and defence posture had to balance on the thin line between reassuring allies that the U.S. remained an active player in Europe, deterring the USSR and Warsaw Pact from militarily testing

[1] NATO (2019): The North Atlantic Treaty, 4. April 1949, Hyperlink: https://www.nato.int/cps/en/natolive/official_texts_17120.htm (Last visit: 04.06.2022).
[2] NATO (2022): Strategic Concepts, Hyperlink: https://www.nato.int/cps/en/natohq/topics_56626.htm (Last visit: 26.11.2022).

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NATO's resolve, and preventing a direct military conflict with the Warsaw Pact, which might have entailed the use of nuclear weapons along "Iron Curtain" (Churchill)[3] in Europe.[4]

At this point, it might be useful to move from the brief history lesson on NATO to a more scientific perspective on deterrence as a concept that was inherently linked to NATO's chief *rationale* in the Cold War. Since the late 1950s[5] onward, the perception of the wider U.S. public that a direct military confrontation between the U.S. and USSR might become increasingly likely gained considerable *momentum*. As a consequence, numerous academic scholars, military strategists as well as analysts from think tanks[6] were tempted to conduct detailed research on the politico-military relationship between two adversarial superpowers – both armed with nuclear weapons and the means to deliver across continents – with the aim of developing applicable solutions that could prevent a cataclysmic war, which could only bring "the end of the world as we know it" (R.E.M.)[7]. In the early 1980s, when tensions between the U.S. and USSR rose yet again, this time over the USSR's deployment of intermediate-range nuclear missiles in Europe, a researcher took note with no small irony that

> "[f]orecasting the role of nuclear weapons in a European conflict is a full-time job for many scholars." (Zelikov).[8]

Two contemporary researchers on deterrence, Zagare and Kilgour, have proven more than two decades that Zelikov was indeed onto something. In a nutshell, the two authors of the seminal book on a contemporary deterrence – Perfect Deterrence Theory – had compiled a short non-exhaustive core list with the names of at least six researchers, who produced key research contributions on various aspects of nuclear weapons, their role for politics as well as conflict.

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[3] Original quote: "From Stettin in the Baltic to Trieste in the Adriatic an iron curtain has descended across the Continent." (Churchill), see: UK National Archives (1946): "Sinews of Peace". Speech of Winston Churchill at Westminster College, Fulton, Missouri, Hyperlink: https://www.nationalarchives.gov.uk/education/resources/cold-war-on-file/iron-curtain-speech/ (Last visit: 09.01.2023).

[4] Zelikow, P. (1983): Visions of the Future War in Europe, pp. 314-321.

[5] In the U.S. public perception, the 1957 'Sputnik shock' (the world's first artificial satellite launched by the USSR) and the 'Missile Gap' scare of the late 1950s (U.S. fear that the USSR has had achieved dominance in the production/deployment of Intercontinental Ballistic Missiles *or* ICBMs) influenced decision-makers to adopt a more robust posture in view of the perceived disadvantage *vis a vis* the Soviet Union. See: ACA (2011): The Missile Gap Myth and Its Progeny, Hyperlink: https://www.armscontrol.org/act/2011-05/missile-gap-myth-its-progeny (Last visit: 10.01.2023).

[6] A particular research 'player' in the field of had been the U.S.-based think tank 'RAND Cooperation', which applied, *inter alia*, mathematically-driven game theory in competition with social sciences-oriented approaches for war-gaming conception. See: Emery, J. (2021): Moral Choices Without Moral Language: 1950s Political-Military Wargaming at the RAND Corporation, pp. 18-31.

[7] An abbreviated quote of and reference to the popular 'doom's day' song "It is the End of the World and We Know It (and I Feel Fine)" of the Rock band R.E.M., see: SPIEGEL (2017): Apokalypse zum Mitgrölen, Hyperlink: https://www.spiegel.de/geschichte/r-e-m-song-it-s-the-end-of-the-world-as-we-know-it-and-i-feel-fine-a-1159798.html (Last visit: 21.07.2022).

[8] Zelikow, P. (1983): Visions of the Future War in Europe, p. 318.

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The collection of research that these and further scholars produced since the beginning of the nuclear age grew into a unique academic work strand: 'Deterrence theory'.[9]

Throughout the Cold War, the proponents of deterrence theory were occupied with analysing the various politico-military aspects pertaining to the prevention of nuclear conflict between the two superpowers, the examination of conditions required by deterrence in order to be successful, and military-related questions about the adequate quantity of a credible nuclear deterrent.[10] However, when the dissolution of the Warsaw Pact begun in 1991 and the U.S. as well as the USSR initiated negotiations for a mutual nuclear arms reduction treaty (i.e. the 1991 START I Treaty), those questions with a view to containing a potential World War III began to lose their urgency. Since the spectre of general strategic nuclear war became increasingly hypothetical (and a case for alternate history) since 1992, deterrence theory as a discipline also began to move away from traditional nuclear deterrence and extend its analytical focus on more imminent deterrence-related challenges of the post-Cold War era, such as deterring rogue states from acquiring nuclear weapons, deterring non-state actors from conducting terrorist attacks, or deterring state authorities to fight a civil war against minorities inside its territorial borders.[11]

Fast forward three decades from 1992 to 2022, Europe appears to be at a crossroads again. In a first reaction to the Russian invasion of Ukraine on 24th February 2022, even serious mass media like the BBC felt compelled to contemplate about the implications of the Russian War in Ukraine as a potential pretext for a larger military conflict between NATO and Russia.[12]

Within the remit of the 2022 NATO summit in Madrid, NATO's member states have decided to increase the military contributions to the transatlantic alliance's deterrence a defence posture to a level unimaginable since the end of the Cold War.[13] In addition to NATO's collective efforts, the U.S. as the key contributor to the transatlantic alliance has decided to undertake further commitments that backs up NATO's forward deployment in Eastern Europe for

[9] "Scholars like Herman Kahn, Thomas Schelling, Albert Wohlstetter, Oskar Morgenstern, William Kaufmann, and Glenn Snyder contributed mightily to its development and refinement." (Zagare/Kilgour) on p. 4, in: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 3-6.

[10] See a brief overview in: Lebow, R./Stein, J. (1995): Deterrence and the Cold War, pp. 157-161; and the first comment by Mearsheimer in: Mearsheimer, J. (2018): Conventional Deterrence: An Interview with John J. Mearsheimer, p. 3; in conjunction with: Mueller, K. (2021): Chapter 4 – The Continuing Relevance of Conventional Deterrence, p. 50. In: *Osinga, F./Sweijs, T. (eds.): NL ARMS Netherlands Annual Review of Military Studies*.

[11] Schwarz, K.-D. (2005): The Future of Deterrence, pp. 5 f., Hyperlink: Hyperlink: https://www.swp-berlin.org/en/publication/the-future-of-deterrence (Last visit: 10.01.2023).

[12] BBC (2022): Russia-Ukraine crisis: How likely is it to escalate into broader war?, Hyperlink: https://www.bbc.com/news/world-europe-60485766 (Last visit: 10.01.2023).

[13] The NATO Response Force, which is a critical component of NATO's deterrence and defence posture in the post-Cold War era, increases from 40.000 to 300.000 military personnel at high readiness level. See: NATO (2022): New NATO Force Model - Infographic, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/2022/6/pdf/220629-infographic-new-nato-force-model.pdf (Last visit: 10.01.2023).

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deterring any potential military aggression by Russia against the allies located at the Eastern flank.[14]

In light of these robust decisions taken by NATO and in view of the barely restricted military aggression by Russia in Europe, the time is ripe to review the existing literature from the research field to develop an up-to-date game-theoretic approach that enables a thorough analysis of (1) the evolution of NATO's deterrence and defence posture throughout the post-Cold War era that explains why, *inter alia*, the stark increase in NATO's posture following the 2022 Russian invasion of Ukraine was necessary, and (2) why the existing cooperative security framework between NATO and Russia could not accommodate Russia's security interests in the Euro-Atlantic region[15].

1.2 The politico-military context of the post-Cold War era

Before the formulation of the research question of this dissertation, we should briefly recall the politico-military context of the Euro-Atlantic at the beginning of the 1990s. Almost fifty years of inter-bloc confrontation between NATO and Warsaw Pact were peacefully resolved by the dissolution of the Warsaw Pact in March/July 1991[16], which unfurled as a consequence of the various internal frictions in the Eastern bloc states and their enforced dependency on the Soviet Union[17]. While the end of the Warsaw Pact was indeed a game changer for NATO – after all, NATO already began the transformation of its strategic concept following a decision by the

[14] US White House (2022): Fact Sheet: The 2022 NATO Summit in Madrid, Hyperlink: https://www.whitehouse.gov/briefing-room/statements-releases/2022/06/29/fact-sheet-the-2022-nato-summit-in-madrid/ (Last visit: 10.01.2023).

[15] The Russian proposals for a NATO-Russia agreement and a U.S.-Russia treaty concerning security guarantees required by Russia, which were submitted by Russia to the respective Western actors in December 2021, are substantial proof of the politico-military alienation between Russia and 'the West'. See the published unofficial translations of the two documents in the archive on: Augen geradeaus! (2021): Agreement on Measures to ensure the Security of the Russian Federation and Member States of the North Atlantic Treaty Organization, Hyperlink: https://augengeradeaus.net/wp-content/uploads/2021/12/20211217_Draft_Russia_NATO_security_guarantees.pdf (Last visit: 10.01.2023); and Augen geradeaus! (2021): Treaty between the United States of America and the Russian Federation on Security Guarantees, Hyperlink: https://augengeradeaus.net/wp-content/uploads/2021/12/20211217_Draft_RUS_USA_security_guarantees.pdf (Last visit: 10.01.2023).

[16] The Warsaw Pact was disbanded in March/July 1991, see e.g. the historical milestones of the Warsaw Pact: US Office of the Historian (n.a.): The Warsaw Treaty Organization, 1955, Hyperlink: https://history.state.gov/milestones/1953-1960/warsaw-treaty (Last visit: 02.03.2022) and: Czarnecka, D. (2015): Dissolution of the Warsaw Pact – 1. July 1991, Hyperlink: https://enrs.eu/article/dissolution-of-the-warsaw-pact-1-july-1991 (Last visit: 02.03.2022).

[17] Examples of this dependency by force could be found, e.g., in the 1956 Hungarian Revolt and the 1968 Prague Spring in Czechoslovakia.

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heads of state and government at the July 1990 London summit[18] and the November 1991 Rome summit[19] – the dissolution of the Soviet Union itself was a much bigger surprise.[20]

The official records from NATO Headquarters give insight into the dramatic moment when the Soviet ambassador at the time shortly left a meeting of the North Atlantic Cooperation Council, returning just a few moments later and then requesting an amendment of the committee's final communiqué, because the USSR just announced its own dissolution.[21]

In reaction to the demise of the Warsaw Pact and the subsequent collapse of the Soviet Union, Western defence policy-makers were put into a critical dilemma from a deterrence and defence policy point of view, which was concisely depicted by Georgi Arbatov, a Soviet/Russian political scientist:

> "[…] we [i.e. the Soviet Union] will do something very bad to you! We will deprive you of your enemy, and we did. […] It is very difficult to justify big military expenditures when the country is in so much need." (Arbatov)[22]

Arbatov had made a strong prediction in regard to the Western defence efforts (not only the defence expenditures) and it was right on the spot when the subsequently occurring massive Western reactions regarding the downsizing of defence budgets, defence equipment and military personnel numbers in Europe are taken into account.[23]

For comparison, in 1971, the U.S. had deployed around 7300 nuclear weapons of all kinds (e.g. surface-to-surface nuclear missiles, nuclear artillery shells, nuclear depth bombs, air-to-surface nuclear bombs) to Europe. After the 2000s, the number of U.S. warheads deployed to Europe have dropped to around 150-200 gravity bombs with adjustable nuclear yield deposited at six airbases of five European partners.[24] As another example, back in 1989 when the Berlin Wall came down, more than 315.000 U.S. soldiers were deployed in European countries. By the time

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[18] NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natolive/official_texts_23847.htm (Last visit: 26.06.2022).

[19] Reference is the Declaration of the November 1991 Rome summit, particularly paragraphs 3 and 4, see: NATO (1991): Rome Declaration on Peace and Cooperation, Hyperlink: https://www.nato.int/docu/comm/49-95/c911108a.htm (Last visit: 25.06.2022).

[20] The Soviet Union was dissolved in December 1991, see: US Office of the Historian (n.a.): The Collapse of the Soviet Union, Hyperlink: https://history.state.gov/milestones/1989-1992/collapse-soviet-union (Last visit: 02.03.2022).

[21] NATO (1991): The Fall of the Wall, Hyperlink: https://www.nato.int/cps/en/natohq/declassified_136619.htm (Last visit: 25.06.2022).

[22] Power, J./Arbatov, G. (2007): From Stalin to Putin, An Insider's View: Talking with Georgi Georgi Arbatov Arbatov, p. 84.

[23] NATO Review (2020): Nuclear deterrence today, Hyperlink: https://www.nato.int/docu/review/articles/2020/06/08/nuclear-deterrence-today/index.html (Last visit: 25.06.2022).

[24] NTI (2012): Delaying Decisions: NATO's Deterrence and Defense Posture Review, Hyperlink: https://www.nti.org/analysis/articles/delaying-decisions-natos-deterrence-and-defense-posture-review (Last visit: 25.06.2022).

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that NATO was actively participating for the first time in a peacekeeping operation in Bosnia and Herzegovina (1995), the number of U.S. Soldiers permanently stationed in Europe had already dropped to around 107.000.[25] Meanwhile, the European member states of the transatlantic alliance made ample use of the opportunity to considerably reduce their own national defence expenditures as well. This trend had been remarkably strong in, but not limited to, Germany as the previous 'frontline' state of the Cold War. From its 2,1% defence expenditure share of the GDP in 1990, Germany has reduced its defence expenditure over two and a half decades to an all-time low 1,1% in 2014/2015.[26]

Despite these radical changes of the politico-military realities of the Euro-Atlantic region since the end of the Cold War, NATO's deterrence and defence posture has prevailed as essential instrument for NATO in implementing its Cold War purpose[27], namely "To deter and defend against any threat of aggression against the territory of any NATO member state" and "To preserve the strategic balance within Europe".[28] In the 2010 Strategic Concept 'Active Engagement, Modern Defence', NATO yet again reiterated 'collective defence' as one of the core tasks since its inception in 1949:

> "The greatest responsibility of the Alliance is to protect and defend our territory and our populations against attack, as set out in Article 5 of the Washington Treaty. The Alliance does not consider any country to be its adversary. However, no one should doubt NATO's resolve if the security of any of its members were to be threatened." (2010 NATO Strategic Concept).[29]

Retaining collective defence as a core task for NATO, required the alliance to conduct continuous examination of its deterrence and defence posture throughout the post-Cold War era[30], but it was only after the 2014 Russia military annexation of Crimea and the proxy war in Donbass that NATO's deterrence and defence posture rose in the priority list of the transatlantic

[25] Statista (2022): Number of United States military personnel in Europe from 1950 to 2021, Hyperlink: https://www.statista.com/statistics/1294309/us-troops-europe/ (Last visit: 05.06.2022).
[26] Bardt, H. (2021): IW-Trends 1/2021: Verteidigungsausgaben in Deutschland, pp. 48-50, Hyperlink: https://www.iwkoeln.de/fileadmin/user_upload/Studien/IW-Trends/PDF/2021/IW-Trends_2021-01-03_Bardt.pdf (Last visit: 25.06.2022).
[27] NATO (2022): Deterrence and defence, Hyperlink: https://www.nato.int/cps/en/natohq/topics_133127.htm (Last visit: 04.05.2022).
[28] Paragraph 20, subpoint III and IV, to be read in conjunction with paragraphs 39-56, see NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natolive/official_texts_23847.htm (Last visit: 26.06.2022).
[29] NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', p. 14, paragraph 16, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 26.06.2022).
[30] For example, the transatlantic alliance has undertaken a NATO Deterrence and Defence Posture Review in May 2012, see: NATO (2012): Deterrence and Defence Posture Review, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_87597.htm (Last visit: 10.01.2023).

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alliance.[31] Deterring Russia from making aggressive moves, including military operations, against exposed member states like the three Baltic states and Poland required NATO to substantiate NATO's deterrence and defence posture.

The pressure to adapt to the new geopolitical realities furthermore increased after Russia finally decided to fully invade Ukraine in 2022. The reference to the 2022 Madrid summit, where NATO decided to adopt a New Force Model[32] for its deterrence and defence posture, was already highlighted in the introduction under subchapter 1.1.

For the *rationale* of this dissertation's conception, it is important to understand that not only the policy-makers in the capitals of NATO's member states were delayed in their reactions to the new geopolitical realities arising from the heightened conflict at the doorsteps of NATO in Eastern Europe.

1.3 The research question

In the academic community, only a few researchers have conducted selectively analyses of certain parts of NATO's contemporary deterrence and defence posture since the 2014 Russian aggression against Ukraine. More recent contributions to this specific research subject were predominantly produced by think tanks and military researchers in reaction to concrete policy changes in NATO[33], aimed at developing political solutions for the 2014 Russia-Ukraine conflict[34], or were testing the robustness of NATO'S forward defence in the Baltic states[35].

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[31] For a brief overview of NATO's history and recent actions, see: NATO (n.a.): A Short History of NATO, Hyperlink: https://www.nato.int/cps/en/natohq/declassified_139339.htm (Last visit: 02.03.2022).

[32] NATO (2022): New NATO Force Model - Infographic, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/2022/6/pdf/220629-infographic-new-nato-force-model.pdf (Last visit: 10.01.2023).

[33] For example, see Yost, D. (2012): NATO's Deterrence and Defense Posture. After the Chicago Summit, p. 1 and pp. 15-17, Hyperlink: https://apps.dtic.mil/sti/pdfs/ADA569924.pdf (Last visit: 22.07.2022); or: Hooker Jr., R./Waddell, R. (1992): The Future of Conventional Deterrence, pp. 78-88.

[34] For examples, see, *inter alia*, the post-2014 Russia-Ukraine conflict contributions on deterrence: Kroenig, M./Slocombe, W. (2014): Why Nuclear Deterrence Still Matters to NATO, Hyperlink: https://www.atlanticcouncil.org/wp-content/uploads/2014/08/Why_Nuclear_Deterrence_Still_Matters_to_NATO.pdf (Last visit: 22.07.2022); Pavel, B./Nordenman, M. (2015): Restoring Order: Deterrence in Europe in the 21st Century. https://www.jstor.org/stable/pdf/resrep18861.pdf?refreqid=excelsior%3A88844553f4627387a37c289275572eb6&ab_segments=&origin=&acceptTC=1 (Last visit: 22.07.2022); Kulesa, L./Frear, T. (2017): NATO's Evolving Modern Deterrence Posture: Challenges and Risks, Hyperlink: https://www.europeanleadershipnetwork.org/wp-content/uploads/2017/10/NATOs-Evolving-Deterrence-Posture-ELN.pdf (Last visit: 22.07.2022); or: Frear, T./Kulesa, L./Raynova, D. (2018): Russia and NATO: How to overcome deterrence instability?, Hyperlink: https://www.europeanleadershipnetwork.org/wp-content/uploads/2018/04/26042018-Deterrence-Russia-NATO-Thomas-Frear-Lukasz-Kulesa-Denitsa-Raynova.pdf (Last visit: 22.07.2022).

[35] For example, the RAND Cooperation published a comprehensive study on NATO's forward deployment in the Baltics in the scope conflict scenario between NATO and Russia, see: Shlapak, D./Johnson, M. (2016): Reinforcing Deterrence on NATO's Eastern Flank: Wargaming the Defense of the Baltics, pp. 1-14, Hyperlink:

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Then, in 2022, a new Euro-Atlantic regional order began to unfold when Russia started a full-scale military invasion of its neighbouring country Ukraine on 24. February 2022.

On June 28, 2022, the heads of state and government of the 30 NATO nations met in Madrid to strategically reorganize the transatlantic alliance. The decisions taken at the NATO summit in Madrid[36] represented nothing less than the largest strategic overhaul of the transatlantic alliance since the end of the Cold War. The scope of the decisions made at the Madrid summit can be illustrated by a specific number: The multinational rapid reaction force (NATO Response Force), which has existed since 2002 and most recently comprised 40,000 soldiers, is to be part of the so-called "New Force Model"[37] be replaced by a multinational force of 300,000 people from 2023, allowing NATO to defend alliance territory with greater reaction speed and throughout all domains (land, air, sea, cyber).

The crucial question that arose for the author of the dissertation in view of this NATO reaction to the Russian invasion of Ukraine was "why?". Why was it necessary for NATO to adjust its deterrence and defence posture in response to the Russian attack on Ukraine? – Within the framework of three previous NATO strategic concepts, collective defence or deterrence and defence has always been part of the central tasks of the transatlantic alliance. In the same vein, the research question of this dissertation is:

How did NATO's deterrence and defence posture evolve in the post-Cold War era in regard to its effect on deterring the militarily most potent third state in the Euro-Atlantic region, Russia?

Rationale: The research question is based on the assumption that the disappearance of the Soviet Union and the dissolution of the Warsaw Pact represented a key turning point for foreign, security and defence policies of the states of the Euro-Atlantic region. As briefly highlighted in the introduction and subchapter 1.3, the immediate deterrence- and defence-related actions that NATO' member states undertook after the end of the Cold War was a considerable drawdown of defence expenditures, reductions in military personnel and equipment, as well as return of forces from their forward deployment positions to their national territory (both U.S. troops and former Soviet forces in Europe).

https://www.rand.org/content/dam/rand/pubs/research_reports/RR1200/RR1253/RAND_RR1253.pdf (Last visit: 08.09.2022).

[36] NATO (2022): 2022 NATO Summit, Hyperlink: https://www.nato.int/cps/en/natohq/news_196144.htm (Last visit: 10.02.2023).

[37] NATO (2022): New NATO Force Model - Infographic, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/2022/6/pdf/220629-infographic-new-nato-force-model.pdf (Last visit: 10.02.2023).

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However, and regardless of the changed geopolitical conditions under which NATO's member states began to operate in since the 1990s, NATO remained adamant in its core tasks that continued to include the promise of the allies to consider an attack on one member as an attack on all others on the basis of Article 5 of the North Atlantic Treaty. In continuity to the Cold War, this also encompassed the potential use of nuclear weapons, when a nuclear-armed state aims at threatening or attacking a NATO member.

In the light of Russia's 2022 war of aggression against Ukraine, the heads of state and government of NATO not only saw the need to once again politically underpin the mutual promise of assistance based on Article 5 of the North Atlantic Treaty, but also the common NATO disposition with a view to a potential military aggression by Russia against a NATO ally (e.g., the Baltic States or Poland) more credibly, i.e., more capable.

Conversely, the decisions of the Madrid summit also meant that the previous NATO disposition, which existed before the Russian attack on Ukraine, did not seem capable of fully fulfilling NATO's promise of assistance in the event of an attack on the territory of an ally to fulfil. This requires an academic review and explanation.

1.3 Temporal and geographic scope of the PhD thesis

As already indicated in the title of this doctoral thesis, the temporal scope has been set from 1992 to 2016 and the geographic reach defined to be the Euro-Atlantic region. Following the general remarks of the introduction that sets the scene for the research question, it is useful to explain what the motivation behind the time and space setting of this thesis was.

In regard to time, the period between January 1992 till December 2016 has been identified in line with key historic events. The Soviet Union officially dissolved in December 1991, the first month of the first year thereafter marks the beginning of a new geopolitical setting and therefore the lower time boundary of this PhD thesis. As for the upper time boundary of the thesis, the end coincides with the ending of the U.S. administration of then President Barack Obama. Since the U.S. has been and remains to be a key decisive state for NATO as institution as well as for the European partners, the emphasis on a singular NATO ally can be justified.[38] In December 2016, the United States Electoral College met to formally cast their ballots, thereby concluding

[38] For quick reference, see NATO (n.a.): The United States and NATO, Hyperlink: https://www.nato.int/cps/en/natohq/declassified_162350.htm (Last visit: 26.06.2022).

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the 2016 US Presidential election process.[39] By the time that this administrative process takes place, the sitting U.S. government usually focusses on the transfer of office matters to the newly elected government.[40] In regard to the actual transfer at the end of 2016, the 44th U.S. President Barack Obama was outgoing after two terms in office and President-elect Donald Trump was about to come in. Since the foreign policy of new U.S. Administration under President Trump in the following year and after had been a challenge in its disruption in NATO policy-making circles, how much of those decisions taken and their impact in view of superseding events (particularly due to the 2022 Russian war against Ukraine) remains to be seen.[41]

In regard to the geography and in line with the title of the thesis, the area under examination is the so-called Euro-Atlantic region. Taking into account that there is no unified definition of what constitutes such a region[42], basic criterion for a state to be relevant to this thesis is the state's interrelationship with NATO, either based on membership[43] in the timeframe 1992-2016, as accession aspirant (Ukraine and Georgia), or as particular partner/rival (Russia). In addition, particular interest and geographic focus is set on the European theatre of operations, meaning that NATO activities in regard to North America, such as the Article 5 operation after the 9/11 terrorist attacks on the U.S., are omitted.

1.4 Structure of the PhD thesis

This dissertation follows the traditional structure used for larger academic texts. This research project is split into four main Chapters, each of which is dedicated to a specific intermediate step for answering the research question.

The initial Chapter 2 offers a comprehensive overview on the 'landscape' of the existing research literature. By the end of Chapter 2, the reader has received a comprehensive overview of (1) essential concepts regarding the field of deterrence and defence, (2) the fundamental structure of the international system with an emphasis on the role of military alliances for inter-

[39] New York Times (2016): The Electoral College Meets Monday. Here's What to Expect, Hyperlink: https://www.nytimes.com/2016/12/18/us/politics/the-electoral-college-meets-monday-heres-what-to-expect.html (Last visit: 02.03.2022).

[40] Huffington Post (2020): Here's where the term 'Lame Duck' comes from, Hyperlink: https://www.huffpost.com/entry/lame-duck-word-origin_l_5fb2f1fec5b6aad41f723613 (Last visit: 02.03.2022).

[41] Deutsche Welle (2020): What's next for NATO after Donald Trump? Hyperlink: https://www.dw.com/en/whats-next-for-nato-after-donald-trump/a-56056751 (Last visit: 02.03.2022).

[42] For the first invocation of Article, see: NATO (2022): Collective defence – Article 5, Hyperlink: https://www.nato.int/cps/en/natohq/topics_110496.htm (Last visit: 25.06.2022).

[43] Members of NATO between 1992-2016 are: Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Turkey, United Kingdom, United States, Czech Republic, Hungary, Poland, Bulgaria, Estonia, Latvia, Lithuania, Romania, Slovakia, Slovenia, Albania, Croatia. See: NATO (2022): Member countries, July 2022, Hyperlink: https://www.nato.int/cps/su/natohq/topics_52044.htm?selectedLocale=en (Last visit: 26.08.2022).

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state relations, and (3) selected theories from the research discipline of International Relations (IR) and Defence Economics, which aspire on one hand to explain the empirically observable state behaviour and on the other hand to predict future actions of states. Furthermore, at the end of Chapter 2, the research gap that the theories presented so far is uncovered.

In Chapter 3, the game-theoretic framework for the empirical analysis of the research question is presented. Following a recombination of the elements of Perfect Deterrence Theory (PDT), which also include the further theoretic development of specific aspects that were not yet part of the theory, several hypotheses on the basis of the game-theoretic framework are formulated, whose validation would lead to the answers required for the research question that is posed in Chapter 1.

Chapter 4 provides the major part of this dissertation, because it provides the operationalisation of the game-theoretic framework into an applicable approach for an empirical case study, namely the examination of the evolution of NATO's deterrence and defence posture throughout the post-Cold War era. After the operationalisation has been conducted, the theory is applied to the empirical reality in line with the basic structure of a PDT game. Before the players are analysed in detail, subchapter 4.3 provides important contextual information regarding the establishment and retention of cooperative security frameworks in the post-Cold War era. It must be known that both rival factions (NATO's member states, especially the U.S., and the Warsaw Pact members, especially the USSR) conducted successful negotiations and found common agreements, *inter alia*, in the field of arms control and disarmament, which were of obvious relevance to the scope of each player's military capabilities.

The main subchapters 4.3, 4.4, and 4.5 addresses the three players of the game: Russia, NATO, and the U.S. The empirical subchapter is concluded with the eventual evaluation of the game outcome in subchapter 4.6.

Lastly, Chapter 5 provides a summary overview on the key details of the previous Chapter 1-4 with a focus on Chapter 3 and 4 as well as an answer to the research questions.

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Chapter 2: Literature review

This chapter provides a summary overview of the existing research literature that has been identified as relevant for an answer to the research question outlined in subchapter 1.3.

Subchapter 2.1 provides a comprehensive overview on definitions and key concepts that this dissertation heavily relies on. In subchapter 2.2, a typological overview of the different empirically observed defence cooperation frameworks is presented and (military) alliance as a specific research object identified and examined in more detail. Subchapter 2.3 presents two of the so-called "grand theories" of the International Relations discipline that provide an understanding about the ways and means the state uses in order to realise its national objective (i.e., military security in this doctoral thesis' case) and where alliances come into play in this endeavour. Subchapter 2.4 provides on overview of selected research contributions from the 'Defence Economics' discipline that individually add more complex theoretical insights on specific cases of state-to-state relations,

Lastly, subchapter 2.5 is intended as a wrap-up of all definitions, concepts and theories presented so far. Furthermore, it provides insight on the research gap in the theory 'landscape' and thereby builds a bridge to Chapter 3.

2.1 Definitions and key concepts

From the inception of International Relations as a contemporary scientific discipline after World War I onward, numerous scholars have contributed to a rapidly growing body of research in that domain, which in turn helped interested readers to understand the world of state-to-state relations. At the same time, with the continuous growth of the discipline, it became clear that textual clarity in terms of 'Do we speak about the same thing?' needed to be a an important precondition for performing research analyses.[44] This subchapter lays the definitory and conceptual groundwork for this PhD thesis. In the following subchapters, the definitions and concepts required to answer the research question are presented: These are (1) the state as key acting unit in the international system, including the setting of national objectives, as well as the introduction to the characteristics of the international system itself. Then, drawing from the previously defined national objective of military security, the consecutive but separate concept pair of (2) deterrence and (3) defence are introduced.

[44] Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, pp. 14-33.

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2.1.1 The state and the international system

As a natural starting point of this doctoral thesis, a definition of the key acting unit is required in order to understand, 'who' the units that interact with each other in the international system are. For this purpose, the state (synonymously called nation-state or country) is set as the single actor in the international system. According to a general definition, a state is defined as:

> "[…] a territorially bounded sovereign polity […] that is ruled in the name of a community of citizens who identify themselves as a nation. The legitimacy of a nation-state's rule over a territory and over the population inhabiting it stems from the right of a core national group within the state (which may include all or only some of its citizens) to self-determination." (Encylopedia Britannica)[45]

This brief definition orients itself close to Jellinek's legal positivist three-elements teachings from the early 20th century[46], which tend to miss out more detailed parameters of the state. Inspiration for a more comprehensive and detailed definition of the nation-state's characteristics comes from the seminal works of Weber. In this sense, a nation-state consists of:

> (a) the claim to the monopoly of the legitimate use of physical force within a given territory;
> (b) centralization of the material and the ideal means of rule;
> (c) planned distribution of the powers of command among various "organs" (a rational constitution);
> (d) an administrative and legal order which claim binding authority not only over the members of the state, the citizens, but to a large extent over all actions taking place within its area of jurisdiction;
> (e) subjection to change of this order through "legislation" (*Satzung*);
> (f) organized activities oriented to the enforcement and realization of this order (an administrative staff);
> (g) regulation of the competition for political offices and selection" (Dusza)[47]

The demonstrated characteristics relate predominantly to the 'inner machinations' of a state. In order to simplify states as units of the international system, four general assumptions that are often used in theories of international relations and in economics shall therefore apply: (1) states are treated as unitary entities, thereby ignoring the individual internal machinations of states, (2) the results of political decisions of a nation-state are defined as rational, which means that national decisions are the result of national interest and oriented towards utility-maximisation for each state, and (3) those political decisions are defined methodologically as exogenous input

[45] Encyclopedia Britannica (n.a.): Definition of 'Nation-State', Hyperlink: https://www.britannica.com/topic/nation-state (Last visit: 05.02.2022).
[46] Heintze, H.-J. (2009): Wann ist eine staatsähnliche Einheit ein Staat?, pp. 11-13.
[47] Dusza, K. (1989): Max Weber's Conception of the State, pp. 74 f.

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in empirical analyses. Furthermore, (4) states are defined as the only acting units at the international level, thereby omitting all non-state actors and limiting the status of international organisations (such as NATO) as international *fora* or frameworks for states to conduct diplomatic exchanges and to negotiate agreements.[48]

The political decision-making circle of the state is responsible for responding to domestic external challenges.[49] These responsibilities include, *inter alia*, the provision of common nationwide laws, welfare programmes and last, but not least, internal and external security (such as police and the justice sector, intelligence services, and last but not least the military forces).[50]

In addition to the general assumptions regarding the concept of the state, each state consists of a set of unique parameters that strongly influences its position in the international system.

Population	Territory	Geographic location	Economic wealth	Other factors

Figure 1: A selection of state-defining parameters [own illustration]

The parameters, which are shortly introduced here, serve two aims: (1) They support explanations for state behaviour in the international system, and (2) they are operationalizable for empirical research.

The population is the sum of individuals that own the citizenship of a specific state. The territory is the measurable size of a state's jurisdiction in square kilometres. It can consist of a land mass and/or islands, depending on specific geography of a state. The geographic location is interrelated to a certain extend with territory, but should be described separately. It consists of factors such as state landlock, island-based, or mixed continental with coastline characteristics. In addition, length of borders, number of adjacent states, as well as access to international sea lanes are important factors. It should be noted that in accordance with Scholvin, geographic parameters, such as size of territory and the specific conditions of a state on the globe, matter, but do not pre-determine political decision-making. In this sense, the research field of geopolitics provides a framework for explaining rather general patterns and long-term processes, than specific individual ad-hoc events. For example, geopolitics does not predict,

[48] Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, pp. 109-111.
[49] The discipline of political philosophy is dedicated to the question on the purpose of the state and its responsibilities, reaching from Aristotle to modern philosophers. Some exemplary theories in that discipline focus on a "common good" as something that the state should provide, for more details, see: Woldring, H. (1999): On the Purpose of the State. Continuity and Change in Political Theories, pp. 155-170.
[50] Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, p. 27.

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when exactly a war breaks out between two states, but it can identify the likelihood for and armed conflict based on geopolitical factors. Furthermore, while geopolitics might support explaining political-decision making, further additional non-geographical factors need to be taken into account as well.[51]

A particularly important further factor is the national economic wealth, which represents an essential cornerstone for the well-being of a state. From a quantitative viewpoint, economic wealth can be measured as Gross Domestic Product (GDP).[52] It entails numerous sub-factors, such as primary resources, production capacities, research and technology level.

Beyond these four parameters, numerous other factors exist, which are omitted in this doctoral thesis. Such factors could be the soft factors that are difficult to quantify, such as national identity, influence from national history, ethics and religion on individuals, as well as measurable but very small-sized impact from the internal geography (mountainous versus sea-side areas) and demographic factors, like the distribution of the national population (north-south or east-west divide or urban-rural variation).

With the basic characteristics of a state and the definition of its parameters, the question is now, what the purpose or aim of a state is. The state has fundamental responsibilities towards its national citizens. The central responsibility of a state according to Hobbes is the protection of its jurisdiction (such as the national institutions, territory and population) against external threats. This is regularly described as 'protection of national sovereignty[53]'.

With a view to the research topic of this PhD thesis, the national objective is thus defined as 'military security' which is in essence

> "[…] the protection of the physical existence of a political community of citizens against external threat." (Spindler)[54]

It should be noted at this point, that the post-Cold War era literature has produced far more complex and detailed definitions of security than the one just introduced. This would extend the definition beyond pure 'military security' and include to e.g., human, economic, political, or social security as well. The Copenhagen School[55] has been a prominent proponent of such

[51] Scholvin, S. (2016): Geographical conditions and political outcomes, pp. 280 f.
[52] GDP is defined as the "monetary value of final goods and services—that is, those that are bought by the final user—produced in a country in a given period of time (say a quarter or a year), see: Definition of Gross Domestic Product (GDP), see: IMF (2020): Gross Domestic Product: An Economy's All, Hyperlink: https://www.imf.org/external/pubs/ft/fandd/basics/gdp.htm (Last visit: 06.03.2022).
[53] As reference to the comprehensive philosophical and theoretical works about the term 'sovereignty, see: Philpott, D. (2020): Definition of 'Sovereignty', Hyperlink: https://plato.stanford.edu/cgi-bin/encyclopedia/archinfo.cgi?entry=sovereignty (Last visit: 03.03.2022).
[54] Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, p. 29.
[55] Knudsen, O. (2001): Post-Copenhagen Security Studies: Desecuritizing Securitization, p. 355 f. and pp. 357-361.

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an extended definition of security, which in turn has received its own share of methodological critique as well.[56] With a view to the research question of this doctoral thesis, the definition by Szypra is considered sufficient to show what states aim for when they make defence-related decisions.[57]

Following this definition of 'military security', the next step is to transform that national objective of protecting the state's existence against external threats into an operationalizable concept. Since protection (or the analogue 'defence') is not a one-off exercise, but a continuous national task, further terminology is helpful for understanding what the national objective should result in from a policy-maker's perspective. Throughout this PhD thesis, 'military security' is ensured by

> "[…] the ability of a state to defend [itself against] and/or deter military aggression." (Szpyra)[58]

The translation of military security into two-specific subcategories represents a minimalist approach that enables (1) clearly defined boundaries about the analytical subject, including the theories for review, and (2) supports the identification of operationalizable variables for empirical analysis. In regard to potential critique, someone could claim that the pursuance of military security through deterrence (and defence) should consecutively lead to a peaceful world, because no state would use military force against another. Reality shows however, that this is clearly not the case. States can pursue 'military security' by aggressive means as well:

> "[…] [M]any countries with national interests located outside their borders entrust their forces with the task of promoting national interests in places and in the manner specified by their governments. In such cases, the use of the armed forces is based primarily on the need to endorse a country's national interests, rather than to defend its sovereignty and territory." (Szpyra)[59]

State activities such as the mentioned pursuit of national interests by using armed forces can indicate a desire to change certain political conditions of the state of affairs in the international system (i.e., the '*status quo*'). The motivation behind such a desired change might rest in the state's level of satisfaction in regard to the current state of affairs in the international system. In case that a state is dissatisfied with a specific part of the *status quo* (if not the *status quo* as

[56] For a short essay on the Copenhagen School and alternative security propositions, see: Politicon (2017): In which ways could Copenhagen School's analysis of security be critiqued by alternative proponents of a new security paradigm?, Hyperlink: https://politicon.co/en/essays/64/in-which-ways-could-copenhagen-schools-analysis-of-security-be-critiqued-by-alternative-proponents-of-a-new-security-paradigm (Last visit 29.05.2022).
[57] Szpyra, R. (2014): Military Security within the Framework of Security Studies: Research Results, p. 59-64.
[58] Szpyra, R. (2014): Military Security within the Framework of Security Studies: Research Results, p. 65.
[59] Szpyra, R. (2014): Military Security within the Framework of Security Studies: Research Results, p. 67

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a whole), it might feel inclined to resort to military force to bring the *status quo* closer to the intended one as a result of its national objective. Such a state is commonly called a 'revisionist' state or power, even though Chan pointed out the difficulty of clearly defining what constitutes a revisionist state.[60] For simplicity, this doctoral thesis uses the terms military aggression and aggressive state, i.e. a state that utilises its armed forces for either threatening military aggression or conducting military aggression against another state.

Despite the conceptual outline of a state as 'unitary actor', it is nevertheless relevant to take a short look on defence expenditures at this point because Brauner has shown that the political system of the respective state matters when determining the size of the defence budget and that autocratic political systems tend to have higher defence expenditures than democratic one's. An explanation for this trend could be the public accountancy of political decision-makers in democratic systems and the risk aversity of democracies in regard to war, while autocratic leaders seem to compensate limitations in popular legitimacy by 'strong-man' military policies.[61] This does however not mean an automatism that democratic states are interested in protecting the *status quo*, while authoritarian states are naturally the aggressive revisionist powers, even though the likelihood of an authoritarian state using military force to change the *status quo* is greater than that of a democratic state doing the same.[62]

If military aggression of one state against another in order to realise the respective national objective of acquiring 'military security' is possible, is the deterrence/defence-related military security definition then incomplete? – No. It is clear that armed forces are inherently able to conduct both defensive and offensive operations, but that does not necessitate the inclusion of military aggression as part of this doctoral thesis' definition of military security. Taking into account the first research question, the functional purpose of this PhD thesis is to identify and measure the protective effect of NATO's deterrence and defence posture for its allies, including the impact that its evolution in the post-Cold War era had on NATO-Russia relations.

After the introduction of the basic building blocks of the characteristics of the acting unit and the definition of its key objective in order to acquire military security, the nature of the international system *per se* is presented as the last part of this subchapter. The formation of the contemporary international system can be traced back to the 1648 'Peace of Westphalia'. In the framework of the international system, states can draw upon different instruments for inter-state interaction. Amongst the peaceful instruments are, *inter alia*, diplomacy and/or agreements,

[60] Chan, S. (2004): Can't get no satisfaction? The recognition of revisionist states, pp. 207-211 and p. 216.
[61] Brauner, J. (2014): Military spending and democracy, pp. 409-411 and 421f.
[62] Lake, D. (1992): Powerful Pacifists: Democratic States and War, pp. 28-30 and pp. 32 f.

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either in written form or established by generally acknowledged international practice. While the international system thus appears to be orderly, there is neither a fixed hierarchy amongst states, nor is there a centralised power that constitutes a sovereign rulership over all states in the system. Hence, the international system is considered 'anarchic'. In this context, all states pursue their own national interests in regard to the various issues at hand, such as security or economic welfare.[63] In the international system, states have a set of instruments at their disposal that they can either use individually or in combination in order to realise their national interests. In the structured U.S. foreign policy-making, this set of instruments is reflected in the DIME spectrum[64]. For this doctoral thesis, the key instruments for acquiring 'military security' are (1) the establishment of national military forces as the foundation for deterrence, and (2) alliance diplomacy as part of a bargaining process with a third state.

How can states ensure that agreements, such as the North Atlantic Treaty for NATO, are kept by all signing parties in spite of a missing central authority that enforces those agreements? – A state abides by an agreement, because the state (1) has an active interest in their existence thanks to the benefits received from the agreement (rationality argument) and (2) because it values its commitment in view of intentions for further potential long-term inter-state cooperation (reputation argument). Based on those conditions, agreements can be perceived as 'self-enforcing'.[65] There are, however, two strategies, which states make use of, that need to be further highlighted with a view to the research question: (1) 'Free-riding' in an alliance, which received ample research contributions and led to the development of the Economic Theory of Alliances[66], and (2) 'defecting' from an agreement in accordance with game theoretical models. Given that agreements between individual states as described above are already more or less formalised 'contracts', there are further more informal elements at the international system as well. Informal agreements, for example, have played an important role in the Cold War, because the political threshold to reach such agreements between two or more states had been comparatively lower than negotiating a complex formal agreement or treaty. In that sense, those

[63] Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, pp. 24-26 and 27-29.

[64] DIME is the acronym for 'diplomatic, informational, military, and economic' means that a state employs in order to realise its foreign policy goals, see: US Joint Chief of Staffs (2018): Joint Doctrine Note 1-18: Strategy, pp. 23-29, Hyperlink: https://www.jcs.mil/Portals/36/Documents/Doctrine/jdn_jg/jdn1_18.pdf (Last visit: 10.06.2022).

[65] Scott, R./Stephan, P. (2004): Self-Enforcing International Agreements and the Limits of Coercion, pp. 564-568 and 590-593, Hyperlink: https://scholarship.law.columbia.edu/cgi/viewcontent.cgi?article=1488&context=faculty_scholarship (Last visit: 10.06.2022).

[66] For a short introduction to this theory, see: Zannella, A. (2020): An Analysis of Burden Sharing in NATO and the Problem of Free Riding, pp 2-8, Hyperlink: https://scholarship.shu.edu/cgi/viewcontent.cgi?article=1058&context=pa (Last visit: 10.06.2022).

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informal agreements have not disappeared with the end of the Cold War and continued to be relevant instruments in diplomacy.[67] The sum of all kinds of agreements, treaties, inter-state contacts and communication channels as well as governing principles (such as strategic stability) between states in the international system with a view on enabling military security as described above could therefore be defined as a 'security architecture'[68], which is

> "[…] an overarching, coherent and comprehensive security structure for a geographically-defined area, which facilitates the resolution of that region's policy concerns and achieves its security objectives." (Tow/Taylor)[69]

Since the security structure in this definition is introduced rather vaguely, it is necessary to add some more detail to that specific term. In that sense, the following definition is applied as supplement, wherein the elements of the structure[70] are provided in more detail:

> "[a] system of norms, practices, relationships, alliances and institutions constructed or developed by nations to address, enhance or ensure international and/or regional security. It is often based on sub-regions." (Snedden)[71]

Based on the above definitions, this subchapter provides in a bottom-up approach for the unit- (state) and system-level (regional security architecture). Furthermore, while there are many different political, economic, social and other factors, from which the specific foreign policy of a state arises, this PhD thesis remains limited to pure 'military security' that states want to acquire, which they do through the decisive concepts of (1) deterrence and (2) defence. Lastly, the concept of 'strategic stability' should briefly be mentioned, because it represents integral part of the international system in relation to military affairs. In research circles, there is no unified definition for this term. Walton and Grey therefore suggested to differentiate between 'strategic stability' with a 'weapons-oriented' focus (which essentially encompassed a numeric comparison between the nuclear weapon arsenals of two or more states) and a 'holistic' type

[67] Lipson, C. (1991): Why are some international agreements informal?, Pp. 495-501.
[68] Tow, W./Taylor, B. (2010): What is Asian security architecture?, pp. 95-97.
[69] Tow, W./Taylor, B. (2010): What is Asian security architecture?, p. 96.
[70] A simplified analogy from the author of this PhD thesis might be helpful to understand the different analytical levels of a 'security architecture': The regional security architecture can be interpreted as a house in the suburb (whereas the suburb as a whole represents the international system with potentially many different regional security architectures or houses in it). Each house rests on walls and pillars as structural foundation, which reflect the peculiar characteristics in each region (e.g. compare multilateral defence cooperation based on NATO in Europe with the dominant hubs-and-spokes alliance system with the USA in East Asia). Nevertheless, all structural foundations, regardless their regional designs, are based on comparable concepts like norms, practices, defence cooperation formats, etc. (i.e. the building material, such as bricks, concrete, mortar that the walls and pillars are made of).
[71] Snedden, C. (2018): Regional Security Architecture: Some Terms and Organizations, p. 7, Hyperlink: https://apcss.org/wp-content/uploads/2018/06/Regional_organizations_Snedden_Apr_2018.pdf (Last visit: 29.05.2022).

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that includes social, economic, technological and other factors that might cause instability.[72] For the research question, strategic stability is of such an importance that is addressed more thoroughly in the dedicated subchapter on deterrence theory, where it the concept is put into context, and subsequently in Chapter 3 as well as Chapter 4, because the continuous balance in strategic nuclear weapon arsenals between the U.S. and Russia as the Soviet Union's primary successor state[73] remains essential for NATO-Russia relations.[74]

2.1.2 Deterrence

With reference to Szpyra's definition 'military security', deterrence and defence as the two key factors are the two quite complex concepts that should herewith be addressed in more detail.[75] For this purpose, the starting point is a basic definition of 'deterrence', which can be

> "[…] summarised as a state attempting to convince an adversary not to use military force, either by threatening retaliation (deterrence by punishment/retaliation) or by thwarting the adversary's operational plans (deterrence by denial)" (Von Hlatky)[76]

The key distinction in deterrence is the strategic objective: Either a state aims at preventing that an aggressor state is able to reach its objectives by military means through own countermeasures (deterrence by denial), or a state threatens to employ a variety of punitive measures, including, *inter alia*, escalation of conflict up to use of nuclear weapons or the application of economic sanctions against an aggressor state (deterrence by punishment) in order to increase the overall costs that the aggressor state must pay when pursuing a conflict-oriented strategy. Supportive to that basic conceptual difference, deterrence can be further classified according to its geographic coverage, i.e., a state that just wants to deter an aggressor from attacking its own national territory or a state that extends its deterrence measures to include third party states, such as member states of an alliance (NATO). Thirdly, general deterrence requires a continuous effort to deter an aggressor, while immediate deterrence represents a crisis-oriented "quick fix",

[72] Walton, C. D. / Gray, C. (2013): Chapter 3 – The Geopolitics of Strategic Stability: Looking beyond Coldwarriors and Nuclear Weapons, pp. 85-97. In: *Colby, E./Gerson, M. (eds.): Strategy Stability: Contending Interpretations*.
[73] Williams, P. (1994): The Treaty Obligations of the Successor States of the Former Soviet Union, Yugoslavia, and Czechoslovakia: Do They Continue in Force, pp. 1-3, pp. 18 f., pp. 22 f., and pp. 35 f.; and: TASS (2020): Kremlin deems Russia de jure and de facto legal successor to USSR, Hyperlink: https://tass.com/politics/1120939 (Last visit: 17.10.2022).
[74] Anthony, I./Janssen, J. (2010): The Future of Nuclear Weapons in NATO, pp. 5-7, Hyperlink: https://library.fes.de/pdf-files/id/ipa/07151.pdf (Last visit: 08.09.2022).
[75] Harrison, T./Cooper, Z./Johnson, K./Roberts, T. (2017): Space Deterrence and Escalation, p. 24.
[76] Von Hlatky, S. (2015): Introduction: American Alliances and extended deterrence, p. 3. In: *Von Hlatky, S./Wenger, A. (eds.): The future of extended deterrence: The United States, NATO, and beyond*.

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such as increasing troop numbers in regions adjacent to the border of an aggressor state, which has performed aggressive moves beforehand.[77]

Deterrence consists therefore of three basic elements: (1) the availability of defence capabilities to conduct military operations in case that deterrence fails, (2) the credibility in the declared intent to conduct military operations in line with the deterrence strategy, which is backed by a comprehensive force structure or presence/power projection of own forces, and (3) a clear communication towards any potential aggressor, when a state executes military operation in line with its deterrence strategy.[78] In accordance with Mazarr, who proposed different conceptual variants, deterrence can be broken down into four categories each with a dichotomous 'expression' that cover different empirical observations of deterrence[79]:

Category	*Expression*
Strategic objective	Denial or Punishment
Territorial confinement	Direct or Extended
Period of time	General or Immediate
Scope	Narrow or Broad

Table 1: Conceptual overview of deterrence based on Mazarr[80]

Throughout this doctoral thesis, 'Deterrence' is understood to have both a denial (conventional) and a punishment (nuclear) component in order to cover the full range of NATO's deterrence and defence posture. Regarding the scope or territorial confinement, NATO's deterrence is obviously extended, as it serves as an umbrella of protection not for a single state only, but a group of states. Regarding the period of time for deterrence, general deterrence is understood as persistent and continuous effort performed by one state to deter any potential aggression by another state, while immediate deterrence occurs in reaction to a crisis situation, such as massing of military troops by another state alongside the own or an allied state's border. Given that the time period 1992-2016 did not provide an immediate symmetric conflict with a peer- or near-peer competitor, general deterrence is therefore of higher relevance for the research question.

[77] Mazarr, M. (2018): Understanding Deterrence, pp. 2-4, Hyperlink: https://www.rand.org/content/dam/rand/pubs/perspectives/PE200/PE295/RAND_PE295.pdf (Last visit: 07.06.2022).
[78] Haffa, R. (2018): The Future of Conventional Deterrence: Strategies for Great Power Competition, pp. 95-97.
[79] Mazarr, M. (2018): Understanding Deterrence, pp. 2-5, Hyperlink: https://www.rand.org/content/dam/rand/pubs/perspectives/PE200/PE295/RAND_PE295.pdf (Last visit: 07.06.2022).
[80] Mazarr, M. (2018): Understanding Deterrence, pp. 2-5, Hyperlink: https://www.rand.org/content/dam/rand/pubs/perspectives/PE200/PE295/RAND_PE295.pdf (Last visit: 07.06.2022).

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Lastly and to conclude the deterrence concept part, the scope of deterrence can be differentiated in a continuum between 'narrow' and 'broad'. As already shown in the strategic objectives, a state needs to decide, whether it employs just military forces of various degrees (conventional and/or nuclear) or if it further extends the range of political tools for deterrence, such as economic sanctions and further diplomatic efforts against the aggressor states. An even broader and more comprehensive approach to deterrence also includes dissuasion measures against the intention of an aggressor state to use military means.[81] The impact of such a "carrot and stick" element in a broadly defined deterrence concept, however, is difficult to operationalise, as the example of U.S. foreign policy towards Russia in the pre-Russian invasion of Ukraine time has shown.[82]

On the first look, the outline of these parameters represents a rather non-interactive perspective on deterrence, but there are three counterarguments to this:

(1) Szpyra stressed that the employment of military (also known as armed forces) by a state subsequently maximises the military security for one state, but might reduce military security of another state, thus prompting the other state to increase its military capabilities, thus an arms races ensues.[83]

(2) deterrence has strong links to economics, because the cost versus gain of military action also plays a key role in the concept. The material and immaterial costs incurred by performing military action of one state against another can be considered an entry barrier for war and could be prohibitive in case that the costs outweigh the potential gains[84], and

(3) deterrence has a strong psychological component, because it attempts at interfering with a potential aggressor's calculation of gains versus costs under partial insecurity due to potential limited information before the aggressor actually attacks. An example of this psychology could be the challenge of new and unknown military technology that the defender might deploy on the battlefield or other issues that are difficult to plan ahead, such as troop morale in the potential war.

So far, the deterrence concept has been introduced on a rather general and generic level, but a key element is still missing:

> "Once, all deterrence was conventional, of course. People didn't often talk about deterrence as a distinct strategic concept because the idea that a country would defend

[81] Mazarr, M. (2018): Understanding Deterrence, pp. 4-5., Hyperlink: https://www.rand.org/content/dam/rand/pubs/perspectives/PE200/PE295/RAND_PE295.pdf (Last visit: 07.06.2022).
[82] The Interpreter (2021): Sticks and carrots in Biden's Russia strategy, Hyperlink: https://www.lowyinstitute.org/the-interpreter/sticks-and-carrots-biden-s-russia-strategy (Last visit: 07.06.2022).
[83] Szpyra, R. (2014): Military Security within the Framework of Security Studies: Research Results, p. 65-68.
[84] Harrison, T./Cooper, Z./Johnson, K./Roberts, T. (2017): Space Deterrence and Escalation, pp. 20 f.

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> itself if attacked, and that in general nations would not attack enemies they did not expect to be able to defeat, seemed self-evident. […] Nuclear weapons pushed conventional deterrence into the background, at least for the superpowers, for a while after 1945." (Mueller)[85]

A distinction between conventional and nuclear deterrence has been formative for deterrence theory therefore since the beginning of the Nuclear Age with the first testing and deployment of nuclear weapons. Nuclear weapons represent a bedrock of deterrence for those states that own them. They offer a destructive capability not existent in previous historic conflicts and provides therefore a true 'game changer' in war. Because the destructive power of nuclear weapons is widely known, the sheer existence of these weapons in one state's military arsenal exhibits an impact on the political decision-making of other states:

> "They [nuclear weapons] deter the use of other nuclear weapons, weapons of mass destruction, conventional weapons, and help achieve diplomatic and political objectives. Nuclear weapons also have political roles. Their existence not only dissuades nuclear use but also decreases the likelihood of the use of conventional force, because of the mutual fear of escalation. By shifting the policy boundaries, nuclear weapons thus make states think twice about the use of force." (Leah)[86]

Thus, nuclear weapons are dual-natured: They have a political role for calculating costs and gains of aggressor states and a military role, once an aggressor state decides to attack anyway. Since the end of the U.S. monopoly on nuclear weapon from the late World War II in 1949, when the Soviet Union made their own nuclear weapon test, the concept of 'Mutually Assured Destruction' (MAD) had risen in prominence. This concept assumes that two or more nuclear-armed states have (1) sufficient nuclear weapons at hand to employ a second-strike capability in order to retaliate the opponent's first strike[87], and (2) the mutual vulnerability of the own state to nuclear weapon attacks that provides an incentive against the use of nuclear weapons by the political decision-makers. These two important factors could be further complemented by trust-building, transparency, and arms control measures between the nuclear-armed states,

[85] Mueller, K. (2021): Chapter 4 – The Continuing Relevance of Conventional Deterrence, pp. 53 f. In: *Osinga, F./Sweijs, T. (eds.): NL ARMS Netherlands Annual Review of Military Studies*.
[86] Leah, C. (2015): Deterrence and Arms Control in a Second Conventional Age, p. 405.
[87] For ensuring such a second-strike capability, both U.S. and Soviet Union built a so-called 'Nuclear Triad', which encompasses of the following three parts: Land-based missiles, long-range strategic bombers with air-launched cruise missiles or gravity bombs, and submarine-launched ballistic missiles. Further refinement of the individual delivery system and nuclear warheads were/are possible. See: Center for Arms Control and Non-Proliferation (2021): Fact Sheet: Nuclear Triad, Hyperlink: https://armscontrolcenter.org/wp-content/uploads/2021/01/Nuclear-Triad.pdf (Last visit: 12.09.2022).

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e.g., encapsulated, *inter alia*, in the 1972 'Anti-Ballistic Missile (ABM) Treaty' of the Cold War era or the 1992 'Open Skies Treaty' from the post-Cold War era.[88]

Since the research question relate to NATO's deterrence and defence posture, it is be useful to provide a short historical outline of its Cold War past that partially lives on into the post-Cold War era. From NATO's founding in 1949 to late 1967, NATO's member states back then agreed to adopt a nuclear strategy of 'Massive Retaliation', where a Soviet attack would be responded with comprehensive nuclear response by the U.S. on the Soviet Union (i.e., deterrence by punishment in line with Mazarr's categorisation above), while conventional forces played a deterrence by denial role in the background. The doctrinal shift in NATO's nuclear deterrence policy came in 1968, when the member states of the transatlantic alliances switched to the 'flexible response' strategy. External reasons for this shift were the growing parity in U.S. and Soviet nuclear arsenals and the experiences made in the 1958-1962 Berlin and 1962 Cuban missile crises. Key decision-makers in the US government responsible for the nuclear deterrence policy came to the conclusion that escalation of minor military engagements to a nuclear response would neither be politically justifiable nor adequate for individual crises (especially because continental U.S. were reachable by Soviet nuclear missiles by the 1960s[89]). NATO's strategy was adopted to be a three-layer approach, wherein NATO tries to defend with conventional means first, before moving to selective potentially limited nuclear strikes (e.g. based on non-strategic nuclear weapons), and lastly going to full strategic nuclear relation.[90]

The rough framework of 'Flexible Response', together with the nuclear-sharing arrangement between the U.S. and selected NATO allies and the nuclear policy-related structures at NATO headquarters remained the key building block of NATO even beyond the end of the Cold War[91]:

> "Credible deterrence and defence, based on an appropriate mix of nuclear, conventional and missile defence capabilities complemented by space and cyber capabilities, remains a core element of NATO's overall strategy to prevent conflict and war." (NATO)[92]

[88] Garcia, Z. (2017): Strategic stability in the twenty-first century: The challenge of the second nuclear age and the logic of stability interdependence, pp. 354 f.

[89] Shea, J. (2009): 1967: De Gaulle pulls France out of NATO's integrated military structure, Hyperlink: https://www.nato.int/cps/en/natohq/opinions_139272.htm (Last visit: 21.07.2022).

[90] Monaghan, S. (2022): Resetting NATO's Defense and Deterrence: The Sword and the Shield Redux, pp. 2-5, Hyperlink: https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/220628_Monaghan_ResettingNATO_DefenseDeterrence.pdf?j73cwvXqZmuKo5VBYY.xPMp3Z7X2y7Yx (Last visit: 19.07.2022).

[91] The details of the NATO nuclear-sharing arrangement and nuclear policy-related committees at NATO HQ are addressed in more detail in Chapters 3 and 4.

[92] NATO (2022): NATO's nuclear deterrence policy and forces, Hyperlink: https://www.nato.int/cps/en/natohq/topics_50068.htm (Last visit: 19.07.2022).

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From the 1980s onward, technology advanced to a level, where one state could at least theoretically diminish the threat from another state's nuclear capabilities. The epitome of this research and technology endeavour became known as the U.S. Strategic Defence Initiative (SDI), launched in 1983 and popularly called 'Star Wars program'. On a conceptual level, the attempt to introduce anti-ballistic missile systems undermines MAD, thus triggering other nuclear-armed states to improve their own nuclear weapon technology, including weapon platforms, in order to overcome the ABM advantage and re-establish MAD. Nevertheless, there are several proponents of ABM that neglect the destabilizing impact of ABM to the general MAD concept and argue instead, that a technically limited ABM could deter smaller and lesser advanced nuclear states, but leave the great power's nuclear first and second-strike capabilities unaffected.[93] In practice, the deployment of ABM installations by NATO allies in Eastern Europe for the purpose of deterring rogue states with smaller arsenals of ballistic missile (i.e. Iran) has triggered stark critique by Russia.[94] The dyadic relationship between MAD and ABM is therefore addressed more thoroughly in the empirical chapter, when analysing the impact of NATO's ballistic missile defence programme[95] on NATO-Russia relations.

What about conventional deterrence in a world with nuclear deterrence then? – In the 1980s, Mearsheimer was one of the first explicit contributors to the case of conventional deterrence[96] through his seminal work named 'Conventional Deterrence'.

In accordance with Mearsheimer, conventional deterrence is inherently linked to military strategy, in which decision-makers of one state try to identify the other side's military objectives. He identified three different strategies that defenders have to cope with: (1) a 'blitzkrieg' (surprise attack with rapid movement of enemy forces on the defending territory; low cost-high gain), (2) a war of attrition (slow forceful movement with extensive investment; high cost-low to medium gain), and (3) military engagement with limited aims (e.g. expeditionary/punitive military operations; low cost-low gain)[97]

There are several decisive elements that play a role in conventional deterrence for both attacking and defending states: (1) amount of available military capabilities (which are addressed in the

[93] Gibilterra, J. (2015): Conditional Deterrence and Missile Defense, pp. 64-67.
[94] See: New York Times (2016): Russia Calls New U.S. Missile Defense System a 'Direct Threat', Hyperlink: https://www.nytimes.com/2016/05/13/world/europe/russia-nato-us-romania-missile-defense.html (Last visit: 04.03.2022).
[95] For a brief introduction to Ballistic Missile Defence or 'BMD', see: NATO (2022): Ballistic missile defence, Hyperlink: https://www.nato.int/cps/en/natohq/topics_49635.htm (Last visit: 18.07.2022).
[96] Mearsheimer, J. (2018): Conventional Deterrence: An Interview with John J. Mearsheimer, p. 3; in conjunction with: Mueller, K. (2021): Chapter 4 – The Continuing Relevance of Conventional Deterrence, p. 50. In: *Osinga, F./Sweijs, T. (eds.): NL ARMS Netherlands Annual Review of Military Studies*.
[97] Mearsheimer, J. (1983): Conventional Deterrence, pp. 33-43 and 52-58.

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next subchapter), (2) territory, e.g. viewed on the basis of topography, (3) speed of decision-making/reaction time, and (4) the availability of precision-guided munitions (PGM).[98] Especially the reference to PGM should not be underestimated, because the technological progress in military equipment has had a key impact on the balance of power between the power blocs of the Cold War and has increased in its impact on military forces since the end of the Cold War.[99] Summarising Mearsheimer's fundamental contribution on the stability of conventional deterrence in face of an aggressive state, he concluded that

> "[…] in a crisis, if one side has the capability to launch a blitzkrieg, deterrence is likely to fail. […] [D]eterrence is likely to hold when a potential attacker is faced with the prospect of employing an attrition strategy, largely because of the associated exorbitant costs and because of the difficulty of accurately predicting ultimate success in a protracted war. […] There is, of course, a third military option: the limited aims strategy. Although it is the least ambitious and the least difficult to implement, it is not likely to lead to war in a crisis." (Mearsheimer)[100]

In line with the research question related to NATO's deterrence and defence posture, the focus is therefore put on the risk of an aggressive state developing military forces in order to enable the launch of a blitzkrieg against the transatlantic alliance, because this has been and remains to be the key challenge for military planners, even if the member states of the alliance have superior military and economic means at their disposal in the long-run.

However, what can a defending state do in terms of conventional deterrence against a potential military aggressor? – Mueller identified four deterrence policy options presented in the matrix below (Table 2):

		Scope	
		Operational	*Strategic*
Threat	*Denial*	Battlefield Defeat	Strategic Defeat
	Punishment	Punitive Resistance	Strategic Retaliation

Table 2: Conventional deterrence categories in accordance with Mueller[101]

The variants 'deterrence by denial' and 'deterrence by punishment' have already been introduced previously through the deterrence concept from Mazarr. The first line, namely 'deterrence by denial', is ensured by a state if it has sufficient military forces available to either defeat the aggressive state's military forces in a concrete clash or series of battles (battlefield

[98] Mearsheimer, J. (1983): Conventional Deterrence, pp. 23 f., 43-52, 58-63, and 189-202.
[99] Leah, C. (2015): Deterrence and Arms Control in a Second Conventional Age, pp. 403 f.
[100] Mearsheimer, J. (1983): Conventional Deterrence, p. 203 and pp. 206 f.
[101] Mueller, K. (2021): Chapter 4 – The Continuing Relevance of Conventional Deterrence, p. 51. In: *Osinga, F./Sweijs, T. (eds.): NL ARMS Netherlands Annual Review of Military Studies*.

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defeat) and/or if his military forces are sufficient to defeat an aggressive state's military forces in the long-run of a longer conflict (strategic defeat). The second line, 'deterrence by punishment', encompasses the intention of a state to continuously attrite an attacking military force, even though the defending state cannot be sure that it is able to defeat the enemy. In addition, strategic retaliation (even conventional one) represents a counter-value strategy of the defending state, who might use technology, such as precision-guided munitions (PGM), in order to respond to attacks on its territory with deep strike attacks on the aggressor state's military, economic or population centres.[102] Following the introduction of the basic concept of deterrence in accordance with Mazarr, the focus lies on 'deterrence by denial' throughout this PhD thesis. Subsequently, the conventional deterrence variants of battlefield defeat and strategic defeat are further used as reference points, while the two 'deterrence by punishment' variants are omitted.

2.1.3 Defence

Following the introduction of the concept of deterrence, 'defence' is now added to the picture as second part of 'military security'. In a nutshell, while deterrence is to dissuade an aggressor's military action, defence is necessary when deterrence has failed and military capabilities are required to reduce the damage caused by the aggressor state taking military action.

> "Thus, deterrence and defense go hand in hand, although the capabilities most valuable for deterrence may not be those most valuable for defense." (Harrison *et al.*)[103]

In conjunction with Szpyra's definition of 'military security', a state aims for the maximisation of its military security (1) by generating sufficient military capabilities in order to deter any attack by another state, and (2) by having sufficient military capabilities to defend its national territory, population and state authority (i.e., preservation of the existence of its constituting national bodies) if an attack by another state occurs.

Since military capabilities are used as the essential element of and key input factor to military security, it is necessary to spend some thoughts on their nature. Despite its popular nature in military planning circles around the world, there is a diversity of national definitions for 'military capability' available. For a quick reference, the U.S. Joint Chiefs of Staff state that military capabilities are

[102] Mueller, K. (2021): Chapter 4 – The Continuing Relevance of Conventional Deterrence, pp. 50-53. In: *Osinga, F./Sweijs, T. (eds.): NL ARMS Netherlands Annual Review of Military Studies.*
[103] Harrison, T./Cooper, Z./Johnson, K./Roberts, T. (2017): Space Deterrence and Escalation, pp. 23 f

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> "[t]he ability to complete a task or execute a course of action under specified conditions and level of performance" (Taliaferro et al.)[104]

National decisions on the size and number of military capabilities in order to deter and defend the country do not result from a clear-cut 'mathematical' process, but depend strongly on the expectation of the state regarding other states:

> "Judging the appropriate level of military preparedness [i.e. all activities pertaining to ensuring military security] is not a science; it is a mixture of intelligent response to credible threats and of judicious, cautious preparation "just in case" this or that should arise." (Encyclopedia Britannica)[105]

In line with the above statement on military capabilities, which should be put in place for 'just in case events of this and that happen', however, further information might be required what 'this and that' actually means.

This is where models of escalation come in – as part of a bargaining process – wherein one state attempts to realise its national objectives in an inter-state dispute versus another state. It does not necessarily need to entail the deployment of military capabilities in view of starting a war. However, with a view to the research question, such an exemplary situation makes sense. It should be stressed that the costs of escalation have to be paid by both states: The escalating state is required to invest resources and soldiers for this policy choice, whereas the targeted state pays by reconstruction of own infrastructure and human lives lost through military action against its population. Key factor in this bargaining process is the cost tolerance, i.e., the resolve of each state to bear those costs. Again, this also entails a lot of psychology, because the aggressive state's perception about the other state's resolve is decisive for opting for an aggressive strategy.[106]

According to Veebel, states have therefore (1) the choice between escalation and de-escalation in state-to-state rivalries, which strongly depends on strategic thinking of political decision-makers (e.g., preference for pre-emptive action or balance of threat policies), (2) the choice between morality and efficiency in their actions, such as whether the costs and gains from pre-emptive action, i.e. attacker, in the short term or the benefit of legitimacy as 'victim'/defender in the long run are preferable, and (3) the choice between investment in deterrence capabilities with retaliatory capacities (e.g. tanks, combat aircraft, etc.) or investment in pure defence

[104] Taliaferro, A./Gonzalez, L./Tillman, M./Ghosh, P./Clarke, P. /Hinkle, W. (2019): What Is a Capability, and What Are the Components of Capability?, pp. 4. f. In: *Institute for Defense Analyses (ed.): Defense Governance and Management*.
[105] Encyclopedia Britannica (n.a.): Definition of 'Defense Economics', Hyperlink: https://www.britannica.com/topic/defense-economics (Last visit: 03.03.2022).
[106] Carlson, L. (1995): A Theory of Escalation and International Conflict, pp. 511-517.

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systems (e.g. air defence systems). Furthermore, there are additional factors that influence national decision-making in regard to the application of military capabilities, such as the existence of norms and taboos (e.g., prohibition of certain weapon types in conflict), the rationality assumption that all states in a conflict act in accordance with, and lastly the credibility argument, according to which states involved in conflict can trust that all deterrents of all parties involved work.[107]

Since defence is deeply intertwined with military capabilities, it is difficult for non-military readers what the term 'military capabilities' (or alternatively 'defence capabilities') actually means. Military capabilities are an essential part of practical military defence planning. Taking the U.S. armed forces as an example, military capabilities can be broken down into multiple components in accordance with the DOTMLPF methodology.[108] Since covering all details of military capability planning would pose an extraordinary challenge from a data availability and granularity level point of view, this dissertation limits the military capabilities analysed to the quantitative numbers of soldiers (personnel) and inventory of military equipment (materiel). Considering that personnel and materiel represent physical aspects of defence, those elements need to be viewed based on two basic and practical principles: (1) 'single set of forces' and (2) 'force thinning'.

The first principle, 'single set of forces', is usually applied in the context of EU-NATO relations and there is no clear-cut singular definition, but think tanks for example make widely use of the term in the following way:

> "[Force formations] are the 'single set of forces' available to the EU or NATO and form the building blocks of international operations." (Drent *et al.*)[109]

And with a view to EU-NATO cooperation:

> "Complementarity of efforts and output is […] made necessary by the principle of "single set of forces", as well as by largely sharing the same kind of threats, having the same Eastern and Southern borders." (Sabatino/Marrone)[110]

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[107] Veebel, V. (2018): NATO options and dilemmas for deterring Russia in the Baltic states, pp. 230-234.

[108] As an example, US military capability planning rests upon the "Doctrine, Organisation, Training, Materiel, Leadership, Personnel, Facilities" (DOTMLPF) methodology, see: Taliaferro, A./Gonzalez, L./Tillman, M./Ghosh, P./Clarke, P. /Hinkle, W. (2019): What Is a Capability, and What Are the Components of Capability?, pp. 6-8. In: *Institute for Defense Analyses (ed.): Defense Governance and Management*.

[109] Drent, M./Wilms, E./Zandee, D. (2017): Making sense of European defence, p. 4, Hyperlink: https://www.clingendael.org/sites/default/files/2017-12/Making_Sense_of_European_Defence.pdf (Last visit: 18.07.2022).

[110] Sabatino, E./Marrone, A. (2020): Europe of Defence in the New World (Dis)Order: Choices for Italy, p. 6, Hyperlink: https://www.iai.it/sites/default/files/iai2020.pdf (Last visit: 18.07.2022).

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On the first look, the 'single set of forces' principle appears to be limited to the armed forces of those states that are members of both EU and NATO. But this assumption is considered incomplete from this doctoral thesis' point of view. In essence, each states defines a national level of ambition in regard to their individual defence and security policies, including size, content, and use of the national military forces. The above definition shows that states could have multiple and potentially conflicting international commitments in parallel, while also pursuing national objectives through the use of its military forces.[111] This dissertation therefore assumes that the deployment of the military forces in other formats than NATO military forces does not *per se* impede on a collective deterrence posture, but it could on the collective defence posture when a sudden crisis with NATO involvement occurs and the state that has its military forces under use for other tasks than NATO collective defence at the same time.

The second principle, 'force thinning', has been discussed by Sandler and Hartley, who have made considerable contributions to the 'Defence Economics' discipline:

> "Consider conventional forces which when deployed along an alliance perimeter are subject to a spatial rivalry in the form of *force thinning* as a given amount of troops and weapons are spread over a longer exposed border." (Sandler/Hartley)[112]

Thus, conventional deterrence relies on the ability to deploy a quantitative number of available military personnel and military equipment to a specific geographical area in order to take effect. This means that the geographical size, including topography, of a military alliance matters, because one state's military forces might need to operate at a distant border region of an allied state to an aggressive third state. [113] From a conceptual point of view, 'force thinning' should therefore be a central factor for defining the scope of military forces and the subsequent military strategy for defending one's own and allied state's territory. At the same time, Sandler and Hartley provide some counterarguments against this assumption.

> "For example, the perfection of precision-guided munitions over the last two decades means that conventional forces do not need to penetrate a front or to be deployed along a front to hit targets with pinpoint accuracy. […] Such weapons reduce thinning and the impurity of conventional forces." (Sandler/Hartley)[114]

[111] A good example of a European state with European operational commitments and national military engagements in parallel, is France. See: French Ministry of Foreign Affairs (2022): France and NATO, Hyperlink: https://www.diplomatie.gouv.fr/en/french-foreign-policy/security-disarmament-and-non-proliferation/our-alliances-and-cooperations/france-and-nato/ (Last visit: 18.07.2022); and Kuwali, D./Nagar, D. (2014): Towards a new Pax Africana: Making, keeping, and building peace in the post-Cold War Africa, pp. 38 f.

[112] Sandler, T./Hartley, K. (2001): Economics of Alliances: The Lessons for Collective Action, p. 876.

[113] Hartley, K./Sandler, T. (1999): NATO Burden-Sharing: Past and Future, pp. 667 f. and 675-677.

[114] Sandler, T./Hartley, K. (2001): Economics of Alliances: The Lessons for Collective Action, p. 879.

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The evolution of technology in conjunction with warfare has a long history. Since the end of the Cold War, the speed of technological progress in military affairs has brought forward the term 'Emerging and disruptive technologies' that is supposed to have a revolutionary effect on armed forces both on the attacking and defending side. One such development concerns increasing effectiveness of weapons used in conflict, such as the precision-guided munitions (PGM).[115] While PGM like unmanned arial systems or beyond-line-of-sight missiles might reduce certain aspects of 'force thinning', this PhD thesis assumes a symmetry for NATO's deterrence and defence posture, wherein a third state has the same or similar PGM available and the subsequent advantages cancel each other out. It is sufficient to say that technology plays a decisive role for conventional deterrence and needs to be addressed in more detail. However, as part to empirical research, 'force thinning' can still be a variable for quantitative analyses.[116] In addition, an important technological aspect has so far not been addressed in defence, namely the advent of nuclear weapons. This question has been conceptually addressed in the previous deterrence subchapter from a strategic perspective, but needs to receive a thorough reflection, particularly when discussing the differentiation of conventional and nuclear deterrence[117] with a view on the role of non-strategic nuclear weapons in NATO's deterrence and defence posture in the post-Cold War era[118]. The above-mentioned challenges posed by technology for defence are therefore revisited in Chapter 3 and the subsequent empirical Chapter 4.

Lastly, moving beyond the assumed failure of deterrence, the subsequent challenge is then for military forces to defend the national territory and population or the territory and population of an allied states as enshrined in NATO's Article 5. If states have arrived at that point in inter-state relations, planning and conducting the military conflict based on a military strategy is then the key challenge. To establish further clarity, a military strategy is

> "[…] the general principles guiding the use of conventional military forces for the overall planning and execution of armed conflict. Strategy can be distinguished from lower-level activities, such as the focus at the operational level on individual battles and campaigns, or the tactical level's attention to the use of individual soldiers and small troop units […]." (Wallace)[119]

[115] Allenby, B. (2013): The Implications of Emerging Technologies for Just War Theory, pp. 49 f. and 58-61.
[116] Murdoch J./Sandler T. (1982): A Theoretical and Empirical Analysis of NATO, pp. 249-257.
[117] This is a question that can be addressed through public goods theory and with input from Olson's and Zeckhauser's Economic Theory of Alliances, see: Hartley, K./Sandler, T. (1999): NATO Burden-Sharing: Past and Future, pp. 666-668.
[118] For a quick wrap-up of the matter of non-strategic nuclear weapons that are provided by the USA to specific NATO allies in Europe, see: American Security Project (2019): US Non-Strategic Nuclear Weapons in Europe. Necessary or Obsolete?, pp. 1-13, Hyperlink: https://www.americansecurityproject.org/wp-content/uploads/2019/07/Ref-0226-US-NSNWs-in-Europe.pdf (Last visit: 19.07.2022).
[119] Wallace, G. (2008): Alliances, Institutional Design, and the Determinants of Military Strategy, p. 225.

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Thus, the triad of (1) military capacity, (2) economic capacity, and (3) technological capacity makes then the difference between 'winning or losing' in the war effort of a given state.[120] While there are further interesting contributions on the far end of the escalation spectrum, such as force level comparisons between attacking and defending military formations[121], the empirically observed time period 1992-2016 was spared from a full scale war between NATO and a peer- or near-peer adversary, such as Russia. Despite the urgency of NATO territorial defence planning which became apparent after the Russian annexation of Crimea[122], such a war scenario is left aside in this doctoral thesis. Nevertheless, an analysis of NATO's deterrence and defence posture with a view to deterring a concrete Russian military attack on the Eastern flank from 2016 onward might be a continuous and highly relevant research topic for years to come.

2.2 Typologies of inter-state defence cooperation

Considering that this dissertation refers to 'multilateral defence cooperation', it is logical to begin with a short definition. In its simplest form, cooperation can generally be defined as intention "to act or work with another or others", "to act together or in compliance" or "to associate with another or others for mutual benefit" (Merriam-Webster dictionary)[123]. Such a broad definition can be easily extended to cover, *inter alia*, defence, but it does not give sufficient credit towards the variety in defence frameworks in terms of duration and intensity of cooperation. Previous research further expands on that concern:

> "The universe of defense agreements is large. Treaty records reveal agreements on everything from war cemeteries to nuclear materials to military cartography. The vast majority of these agreements focus narrowly on specific threats or issues, and many follow from unique historical events, such as wars, occupations, state failures, or

[120] Brooks, S./Wohlforth, W. (2016): The Rise and Fall of the Great Powers in the Twenty-first Century: China's Rise and the Fate of America's Global Position, pp. 16-22.
[121] The 3:1 ratio is predominantly used as a simple "rule of thumb" in defence planning, wherein an attacker requires three-times as many units as the defender of the same size. For more details, see: Mearsheimer, J. (1989): Assessing the Conventional Balance: The 3:1 Rule and Its Critics, pp. 56-62.
[122] RAND has conducted a comprehensive wargaming exercise with various experts in 2016 to determine NATO defence posture in the Baltic states and Poland. The results have shown considerable critical shortfalls in NATO's deterrence and defence posture in terms of military capabilities. See: Shlapak, D./Johnson, M. (2016): Reinforcing Deterrence on NATO's Eastern Flank: Wargaming the Defense of the Baltics, pp. 1-14, Hyperlink: https://www.rand.org/content/dam/rand/pubs/research_reports/RR1200/RR1253/RAND_RR1253.pdf (Last visit: 08.09.2022).
[123] Definitions of the verb 'to cooperate', In: Merriam-Webster (n.a.): Definition of 'cooperate (Verb)', Hyperlink: https://www.merriam-webster.com/dictionary/cooperate (Last visit: 02.02.2023).

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> colonialism. Glaring asymmetries are common, and few agreements are long term." (Kinne)[124]

As such, multilateral defence cooperation can be of all kinds, from structural cooperation between the national military forces in terms of joint formations[125] over a hybrid defence industrial/politico-military cooperation[126] to case studies on specific joint armaments development and procurement programmes[127]

In view of the complexity, 'multilateral defence cooperation' is hereby limited to specific formalised long-term comprehensive defence political framework, defined as 'alliance' or 'military alliance' (used as *analogon*). Before entering into the details of 'alliance's' characteristics as a defence cooperation framework in the next subchapter, it is necessary to take a step back for a moment to gain a comparative perspective between 'alliances' and other longer-term, formalised defence cooperation frameworks.

Wilkins provides an approach to categorise different defence cooperation frameworks drawn from empirical observations of existing cooperation formats from past and present times, thereby giving important insight into different formalised inter-state defence cooperation frameworks in general. It is important to note beforehand that Wilkins' analysis is based on empirical analysis using qualitative data and attempts to cover cooperation as observed in reality in a streamlined way under the term of 'alignment'. While 'alignment' is a rather generic term, Wilkins considers nevertheless as an essential part of state-to-state relations in the international system.[128]

Table 3 depicts five different archetypes, based on empirical observation of structured defence- and security-related cooperation formats amongst states in the international system.

[124] Kinne, B. (2018): Defense Cooperation Agreements and the Emergence of a Global Security Network, pp. 802 f.
[125] Zandee, D./Drent, M./Hendriks, R. (2016): Defence cooperation models, pp. 1-2, Hyperlink: https://www.clingendael.org/sites/default/files/pdfs/Report_Defence_cooperation_models.pdf (Last visit: 05.06.2022).
[126] Drent, M./Zandee, D. (2018): More European defence cooperation: The road to a European defence industry?, pp. 2-10, Hyperlink: https://www.clingendael.org/sites/default/files/2018-06/PB_European_Defence_Cooperation_European_Defence_Industry_0.pdf (Last visit 10.06.2022).
[127] Antill, P./Ito, P. (2013): The UK and the Joint Strike Fighter: The trials and tribulations of international collaborative procurement, pp. 13-29.
[128] Wilkins, T. (2012): 'Alignment', not 'alliance' – the shifting paradigm of international security cooperation: toward a conceptual taxonomy of alignment, pp. 53-58.

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Archetype	*Description*	*Format*	*Characteristics*	*Examples*
Alliance	"'[…] formal associations of states for the use (or non-use) of military force, in specified circumstances, against states outside their own members. '" *(Definition of Snyder)*[129]	Unilateral, bilateral, or multilateral	- Defensive or offensive military cooperation - Often aimed at a specific foe (balancing) - Formalized by a treaty among member states	NATO, Warsaw Pact
Coalition	"'[…] a grouping of like-minded states that agree on the need for joint action on a specific problem at a particular time with no commitment to a durable relationship. '" *(Definition of Pierre)*[130]	Multilateral (limited bilateral)	- More informal, narrowly-focused and short-lived - War-fighting alignments - Forms when a threat has not been foreseen and states are caught by surprise - Adaptable to address new military tasks	Coalition of the Willing (2003)
Security community	"'Creation of a peaceful comity of states through gradual confidence building and integration'" *(Definition of Wilkins based on Deutsch et al.)*[131]	Multilateral	- States align to eliminate the use of violence as a recourse of action within their designated political space - 'shared identities, values and meanings' - 'pluralistic' or 'amalgamated' or 'comprehensive'	ASEAN, US, EC/EU
Strategic partnership	"'[…] structured collaboration between states (or other 'actors') to take joint advantage of economic opportunities, or to respond to security challenges more effectively than could be achieved in isolation'." *(Definition of Wilkins)*[132]	Bilateral (limited multilateral)	- Organized around a general (security) purpose ('system principle') - Goal-driven - Partner does not see the other as a threat - Informal nature and low commitment costs	NATO-EU, US-India

[129] Snyder, G. (1997): Alliance Politics, p. 4; and: Wilkins, T. (2012): 'Alignment', not 'alliance' – the shifting paradigm of international security cooperation: toward a conceptual taxonomy of alignment, p. 59.
[130] Pierre A. (2002): Coalitions – Building and Maintenance, p. 2; and: Wilkins, T. (2012): 'Alignment', not 'alliance' – the shifting paradigm of international security cooperation: toward a conceptual taxonomy of alignment, p. 63.
[131]; and Deutsch, K./Burrell, S./Kann. R. (1957): Political Community and the North Atlantic Area: International Organization in the Light of Historical Experience, p. 5; and Wilkins, T. (2012): 'Alignment', not 'alliance' – the shifting paradigm of international security cooperation: toward a conceptual taxonomy of alignment, p. 65.
[132] Wilkins, T. (2011): The Russo-Chinese Strategic Partnership: A New Form of Security Cooperation?, p. 363; and: Wilkins, T. (2012): 'Alignment', not 'alliance' – the shifting paradigm of international security cooperation: toward a conceptual taxonomy of alignment, p. 67.

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Other alignments	Entente, Concert, Non-Aggression Pact	Bilateral or multilateral	- Formal or informal arrangements - Long-term oriented - Specific or general	Congress of Vienna, Triple Entente

Table 3: Summary overview of Wilkins' taxonomy of cooperation[133]

Wilkins admits that the empirical observations above can have characteristics of more than one archetype or that an 'alignment' can be a subset of another 'alignment' (such as the UK-U.S. 'special relationship', while both are NATO allies). Furthermore, the case of 'non-alignment' presents another analytical challenge, because empirical evidence from the Cold War (i.e. in relation to the 'Non-Aligned Movement' suggest a classification of formalised non-alignment as a type of alignment *sui generis*.[134]

Wilkins' empirically driven typology of 'alignment' is helpful to gain an initial comparative perspective on defence cooperation, but a more structured deductive approach might provide an enhanced understanding about the distinctiveness of 'alliances' in comparison to other defence cooperation frameworks. In that sense, Russett proposed to differentiate defence cooperation frameworks along the following criteria: (1) the number of participating member state, (2) the scope of the defence cooperation, (3) the grade of formalisation of the defence cooperation, (4) the intended duration of the cooperation, and (5) the distribution of power (or level of symmetry) between participating member states.[135]

Russett's approach enable better examination of institutionalised long-term defence cooperation formats that would be difficult to relate to Wilkins' archetypes.[136] In accordance with Russett's typology, NATO can therefore be identified as a 'military alliance', which has (1) a specific number of members at any given time, a comprehensive (2) scope and (3) grade of formalisation that are based on the founding North Atlantic Treaty, and (4) an unlimited duration of cooperation, since the North Atlantic Treaty does not foresee any clause of terminating the alliance (notwithstanding the sovereign right of each member state to formally

[133] Table based on Wilkins, T. (2012): 'Alignment', not 'alliance' – the shifting paradigm of international security cooperation: toward a conceptual taxonomy of alignment, pp. 59-72.
[134] Wilkins, T. (2012): 'Alignment', not 'alliance' – the shifting paradigm of international security cooperation: toward a conceptual taxonomy of alignment, pp. 73-74.
[135] The five parameters are simplified from Russett's comprehensive set of alliance characteristics and generalised in order to be applicable to defence cooperation frameworks beyond military alliances, see: Russett, B. (1971): An Empirical Typology of International Military Alliances, pp. 265-268.
[136] For a brief overview of five specific case studies on operational defence cooperative formats in Europe, see: Zandee, D./Drent, M./Hendriks, R. (2016): Defence cooperation models, pp. 10-54, Hyperlink: https://www.clingendael.org/sites/default/files/pdfs/Report_Defence_cooperation_models.pdf (Last visit: 05.06.2022).

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leave the organisation in accordance with Article 13 of the North Atlantic Treaty).[137] In regard to the criterion (5), NATO represents an analytical challenge, because decision-making inside the transatlantic alliance is based on unanimity rule of one state-one vote, while the U.S. dominates the alliance from a military capability point of view. At least in regard to NATO's nuclear deterrence, this asymmetry which tilts towards the U.S. was intentional from the very foundation of the transatlantic alliance.[138] The discussion on fair burden-sharing inside the alliance with reference to the conventional forces contributed by the other (European) NATO allies is a separate matter and is addressed in the Economic Theory of Alliances[139].

Both the inductive Wilkins and the deductive Russett approaches enable a structuring and categorisation of multinational defence cooperation frameworks. Another question would be why states choose a specific cooperative format over another in a specific situation.[140] A functional explanation for such a choice between different types of defence cooperation can be framed in accordance with the ends-ways-means terminology from military strategy. In this context, two or more states that choose to undertake defence cooperation negotiate with the aim of identifying the common ground between their respective national politico-military goals. Then, the participating member states of that cooperation-in-the-making must agree on the set of instruments (ways) as well as resources (means) that are required to implement the defence cooperation.[141] If ends, ways and means align between those negotiating states, the conditions for the defence cooperation framework are then set accordingly. Such an approach would set the format of the defence cooperation as a result of the function that it is intended to perform.[142] In this aspect, the ends-ways-means approach to identify a specific defence cooperation framework would represent an economic optimisation problem, i.e. the combination of input factors (ways) that lead to the output maximum (ends) under a budget constraint (means).[143]

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[137] NATO (2019): The North Atlantic Treaty, 4. April 1949, Hyperlink: https://www.nato.int/cps/en/natolive/official_texts_17120.htm (Last visit: 04.06.2022).

[138] Thimm, J. (2018): NATO: US Strategic Dominance and Unequal Burden-Sharing Are Two Sides of the Same Coin, Hyperlink: https://www.swp-berlin.org/en/publication/nato-us-strategic-dominance-and-unequal-burden-sharing-are-two-sides-of-the-same-coin (Last visit: 19.07.2022).

[139] Burden-sharing had been one of the formative reasons for the existence of this theoretical strand, see: Sandler, T./Hartley, K. (2001): Economics of Alliances: The Lessons for Collective Action, pp. 869 f.

[140] See an explanation for the states' motivation for seeking alliances in, Fedder, E. (1968): The Concept of Alliance, pp. 67 f.

[141] US Joint Chief of Staffs (2019): Joint Doctrine Note 2-19: Strategy, pp. 13 f., Hyperlink: https://www.jcs.mil/Portals/36/Documents/Doctrine/jdn_jg/jdn2_19.pdf (Last visit: 05.06.2022).

[142] McLaren, R. (1985): Mitranian Functionalism: Possible or Impossible?, pp. 139 f. and 141-143.

[143] The US Planning, Programming and Budgeting System (PPBS) offers a practical example of the influence of economics on military affairs, e.g. through the application of cost-benefit analyses on military capabilities. However, the PPBS has an issue in quantifying the defence output value and due consideration of the enemy force potential, see: Hartley, K. (2020): Defence Economics, Achievements and Challenges, pp. 9-11. In: *Hartley, K. (ed.): Elements of Defence Economics*.

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While this apparently simple input-to-output logic has certain benefits, it ignores the social dimension that states operate in at the international level. In accordance with Mattes, there are further perceptive factors that might influence a state's choice for a particular cooperation format over another, such as (1) the reliability of the other state(s) that are intended to become cooperation partner(s), (2) the severity of the threat that the state faces at a given time, and (3) the discrete national benefits gained from choosing a particular design of defence cooperation.[144]

The diversity of defence cooperation frameworks invites for further comparative analyses and typology-building exercises in regard to the defence cooperation framework 'landscape'. Such an endeavour would require a strong theoretical basis as a foundation and furthermore the screening of large volumes of historical and contemporary empirical data for defence cooperation in the international system to test assumptions drawn from the theoretical basis. However, this is of limited relevance to the research question. Since it is the aim of this doctoral thesis to explore NATO's deterrence and defence posture, the next subchapter provides first of all a thorough review of 'military alliances' from a generic angle to form the basis for working out the uniqueness of NATO as a real-world example for such a 'military alliance'. The distinction between 'military alliances' as a concept and NATO as an empirical test case is warranted, because 'military alliances' can also be of a completely different nature in scope and structure.[145]

2.2.1 The characteristics of NATO as a military alliance

NATO represents a particularly interesting case for a military alliance that was deeply enshrined in the history of the Cold War but able to survive dissolution of its key military opponent. Before diving deeper into the specifics of NATO as a 'real-world example', the conceptual starting point should be a general definition of the term. A 'military alliance' constitutes

> "[…] a formal agreement among a limited number of countries concerning the conditions under which they will or will not employ military force." (Russett)[146]

The simplicity of such a generic definition is useful as a thematic backdrop against which the complexity of alliances as a specific form of defence cooperation framework can be further laid out. Thus, 'military alliances' can be offensive, such as the Axis powers that cooperated in order

[144] Mattes, M. (2012): Reputation, Symmetry, and Alliance Design, pp. 703-705.
[145] The difference between different 'military alliances' can be, *inter alia*, displayed by direct comparison of different alliances, and particularly those that represent dyadic pairs, such as NATO and the Warsaw Pact.
[146] Russett, B. (1971): An Empirical Typology of International Military Alliances, pp. 262 f.

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to enable military aggression against neighbouring countries in World War II, as well as defensive, wherein the member states aim to deter aggression from non-member states and eventually defend its members in case that deterrence fails and a member is attacked.

At this point, it is necessary to define three central assumptions that apply throughout this dissertation are: (1) This thesis focusses on NATO as a *defensive alliance* as enshrined North Atlantic Charter[147] and as continuously reiterated by the transatlantic alliance representatives[148], (2) a defensive alliance such as NATO does not necessarily need to be 'peaceful', because defence includes not only defensive but also offensive operational capabilities[149], and (3) NATO involvement in crisis management operations (notwithstanding individual NATO allies' participation in non-NATO operations) do not make the case for NATO as an offensive, i.e. aggressive, military alliance[150].

When looking at the conditions of a defensive alliance's creation, the motivation of the individual member states requires first attention. There is a whole body of academic literature, particularly from the various theoretical 'schools' of IR, which try to explain the formation of alliances based on the 'balance of power/threat' approaches but this is addressed in the Chapter 2.3. An alternative approach to determining reasons for alliance formation has been proposed by Fedder through some interesting thoughts based on geostrategic reasoning. He distinguishes three basic motivations for a state to enter an alliance with other states: (1) Augmentation of one's own national military forces with the allied state's military forces to counter a third state, (2) Pre-emption by which a state enters an alliance with another state in order to prevent the

[147] See Article 1 and 2 of the North Atlantic Treaty, NATO (2019): The North Atlantic Treaty, 4. April 1949, Hyperlink: https://www.nato.int/cps/en/natolive/official_texts_17120.htm (Last visit: 04.06.2022); in conjunction with NATO (2022): Deterrence and defence, Hyperlink: https://www.nato.int/cps/en/natohq/topics_133127.htm (Last visit: 04.05.2022).

[148] Former NATO Secretary General Anders Fogh Rasmussen: "NATO is not an enemy and is not directed against Russia; let us talk and find areas to work together; let us build a relationship based on trust, cooperation and shared interests.", in: Rasmussen, A. (2009): Priorities as Secretary General of NATO, p. 171; and more recently in 2021, the NATO heads of governments and state declared: "We have suspended all practical civilian and military cooperation with Russia, while remaining open to political dialogue. […] We will continue to respond to the deteriorating security environment by enhancing our deterrence and defence posture, including by a forward presence in the eastern part of the Alliance. NATO does not seek confrontation and poses no threat to Russia.", in: NATO (2021): Brussels Summit Communiqué, paragraph 9, Hyperlink: https://www.nato.int/cps/en/natohq/news_185000.htm (Last visit: 23.07.2022).

[149] For a conceptual perspective, see: Monaghan, S. (2022): Resetting NATO's Defense and Deterrence: The Sword and the Shield Redux, pp. 2 f. and 6-8, Hyperlink: https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/220628_Monaghan_ResettingNATO_DefenseDeterrence.pdf?j73cwvXqZmuKo5VBYY.xPMp3Z7X2y7Yx (Last visit: 19.07.2022).; for a more doctrinal focus on offensive and defensive operations, see U.S. Department of the Army (2019): Army Doctrine Publication (ADP) 3-90: Offense and Defense, pp. 3-1 – 3.19 and 4-1 – 4-20, Hyperlink: https://irp.fas.org/doddir/army/adp3_90.pdf (Last visit: 23.07.2022).

[150] In the public debates since the 1998 NATO intervention in Kosovo, see: O'Connell, M. (2000): The UN, NATO, and International Law after Kosovo, p. 1 and pp. 73-83; or the 2010 NATO Operation in Libya, see: Kuperman, A. (2013): A Model Humanitarian Intervention? Reassessing NATO's Libya Campaign, pp. 105-107, 113-123, and 125-128.

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allied state from entering an alliance with a third state, and (3) Strategic capacity building, whereby a state allies with another state in order to gain access to that allied state's territory (for military bases, airfields etc.) for the purpose of projecting power beyond the reach of its national territory.[151] This overview of different intentions adds 'utilitarian motives' based on strategic thinking to the more or less rational 'threat perception' by which states decide to create or enter military alliances. Especially (3), the element of strategic capacity building as represented by the permanent stationing of U.S. military forces in Europe is an important factor for the overall deterrence and defence posture of a military alliance when the state with considerable strength in military forces is located several thousand kilometres away from the other allies.[152] This had been a win-win situation because it enabled e.g. the U.S. to make use of allied territory for military deployments (*albeit* on a much lower scale than in the Cold War[153]), while the allied states ensured that the U.S. government retained a strong interest in geostrategic security and defence environment in Europe (and revisionism in Europe under control)[154].

Following the reasons on which alliances can be created, additional considerations need to be put on the alliance 'contract', i.e., the written agreement between the cooperating states, which includes the scope of their military alliance and which is the outcome of bargaining between the potential member state's politico-military positions. In this process, the states clarify their own commitments to other cooperating states and formulate security-related expectations that they wish to gain from that collective alliance.[155] Amongst the different available defence cooperation frameworks, a formalised military alliances is not an easy undertaking for its member states, even if a first common understanding between the member states is reached:

> "[…] [T]here are two features that distinguish an alliance. It is a group of individual decision makers who: (i) share a common interest, yet also have heterogeneous preferences; (ii) must take a common stance in negotiations." (Manzini/Mariotti)[156]

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[151] Fedder, E. (1968): The Concept of Alliance, pp. 67 f.
[152] The NATO Declassified archives show that the distance of strategic conventional deployments from the USA to the Central European Theatre of Operations would encompass 6000 km sealine and 800 km landline from Western France to the potential frontline in Western Germany. In comparison, Soviet troops had to cross 650 km from the USSR to Eastern Germany, see: NATO (n.a.): The Cold War – Defence and Deterrence, picture 14, Hyperlink: https://www.nato.int/cps/en/natohq/declassified_138256.htm (Last visit: 25.07.2022).
[153] Statista (2022): Number of United States military personnel in Europe from 1950 to 2021, Hyperlink: https://www.statista.com/statistics/1294309/us-troops-europe/ (Last visit: 05.06.2022).
[154] A reference to the famous quote of NATO's first Secretary General Lord Hastings Lionel Ismay that NATO was created to "keep the Soviet Union out, the Americans in, and the Germans down.", see: NATO (n.a.): Origins – NATO Leaders, Hyperlink: https://www.nato.int/cps/en/natohq/declassified_137930.htm (Last visit: 21.07.2022); and: McCalla, R. (1996): NATO's persistence after the Cold War, p. 448.
[155] Snyder, G. (1990): Alliance Theory: A Neorealist First Cut, pp. 111 f.
[156] Manzini, P./Mariotti, M. (2005): Alliances and negotiations, p. 129.

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Subsequently and after adopting the formal alliance contract, the member states need to continuously work on various tasks as part of the alliance management, such as coordination of defence policy and military planning or distribution of the burden of costs arising from cooperation through a formalised alliance. In this sense, Snyder identified policy levels that a military alliance is required to perform tasks at: (1) the armament level, i.e. ensuring that required military capabilities are available for the deterrence and defence against an external threat (2) the action level, i.e. the decision-making processes need to be in place to jointly decide on 'attack or not attack an adversary' or 'defend or not defend an ally', and (3) the declaration level, where the expectation management in its widest sense in regard to third states in terms of signalling is managed.[157]

The armament level represents a challenging task because every member state is in fact first and foremost responsible for its own military forces. In order to ensure operational compatibility between the deployed forces in manoeuvre and combat, numerous military and civilian personnel are tasked with the establishment of common standards in doctrine, equipment, or training (including English language courses – one of the two working languages of NATO). Furthermore, the alliance has developed processes that ensure the identification of military capabilities needed for the joint deterrence and defence posture.[158] One element from the armament level, often looked upon from the Defence Economics' perspective, is the defence market/defence equipment procurement side. Basically, all states participating in NATO might have a more or less vested interest that the partner states sport the military capabilities required for NATO's deterrence and defence posture[159]. Nevertheless, provision of defence capabilities represents one of the most controversial challenges because of its strong connections to domestic, European and U.S. defence industrial policies. The current defence industrial framework between European and U.S. defence companies might potentially enable NATO to have the optimum of defence output at its disposal due to the complex national decision-making with a view to industrial jobs for domestic workers, ownership of intellectual property rights regarding defence research and technology advances, and competition in supplying comparable

[157] Snyder, G. (1990): Alliance Theory: A Neorealist First Cut, pp. 104-107 and 112 f.

[158] The so-called NATO Defence Planning Process (NDPP) is the anchor point for NATO's deterrence and defence posture. The NDPP consists of five steps for a four-year cycle, but also includes planning horizons for short-, medium-, and long-term planning, see NATO (2022): NATO Defence Planning Process, Hyperlink: https://www.nato.int/cps/en/natohq/topics_49202.htm (Last visit: 22.07.2022).

[159] Notwithstanding individual politico-military rivalries prone to escalation, such as the Greece-Turkey tensions since the 1974 Turkish invasion of Cyprus, including the occupation of Northern Cyprus since then, and Turkish ongoing claims to Greek island in the Sea. Both of which continue to spoil good neighbourly relations in conjunction with NATO, see: Dempsey, J. (2020): Judy Asks: Is NATO Paralyzed Over the Greece-Turkey Conflict? Hyperlink: https://carnegieeurope.eu/strategiceurope/82643 (Last visit: 25.07.2022).

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products to NATO member states.[160] For the aim of this dissertation, it is sufficient that the military capabilities are available, regardless of their industrial producers' origin. From a more geostrategic perspective, the volume of arms transfers from one member state to individual allied states should pursue a balanced approach in order to avoid (1) an undersupply of military capabilities in an allied state, thereby weakening the joint deterrence and defence posture, and (2) an oversupply of military capabilities in an allied state, through which the allied state in question could feel emboldened to pursue a more aggressive foreign policy posture, thus leading to an 'entanglement' of other allied states by the actions of that one aggressive ally.[161]

Turning to the action level, the political control exercised is usually based on unanimity between the member states of an alliance. This is not different from the realities that NATO as a military alliance has conducted its activities from its very inception with the North Atlantic Council (NAC) as its 'political heart' and further subsidiary and specialised working bodies wherein more member state representatives support the ambassadorial level of the NAC with specialised advice.[162] Furthermore, those committees are served by an international staff, which recruits itself of individuals from all NATO member states, and is located at the political headquarters of NATO in Brussels, Belgium. Such decision-making structure and organisation of a military alliance provide the framework through which member state decide and take actions. In practice, all member states are free to decide therein based on their national interests. There are, however, conceptual boundaries to national decision-making. Two aspects to the above mentioned 'entangling alliance' momentum for member states should be examined more closely: (1) entanglement by self-restriction, and (2) entanglement by latent complicity. In regard to entanglement by political self-restriction, a member state is bound to a certain but varying degree to the collective decisions of the alliance.[163]

Conceptually, such an entanglement might pave the way for a restrained rather than emboldened foreign policy of its member states, thus providing more military security for allied members that feel entanglement of latent complicity or third states in regard to the reduction of the escalation potential in a selective case of tensions or crisis.[164] In addition, this kind of entanglement could be translated into a public-goods oriented security-autonomy trade-off

[160] Hartley, K. (2006): Defence Industrial Policy in a Military Alliance, pp. 475-487.
[161] Yarhi-Milo, K./Lanoszka, A./Cooper, Z. (2016): To Arm or to Ally? The Patron's Dilemma and the Strategic Logic of Arms Transfers and Alliances, pp. 93-102.
[162] The North Atlantic treaty of 4th April 1949 is the founding document for NATO and subsequently the first point of reference for the conduct of NATO collective actions, see: NATO (2019): The North Atlantic Treaty, 4. April 1949, Hyperlink: https://www.nato.int/cps/en/natolive/official_texts_17120.htm (Last visit: 04.06.2022).
[163] Johnson, J. (2015): The cost of security: Foreign policy concessions and military alliances, pp. 665-667.
[164] Fang, S./Johnson, J./Leeds, B. (2014): To Concede or to Resist? The Restraining Effect of Military Alliances, pp. 775-779.

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model for member states of an alliance, which is more thoroughly reviewed in the subchapter 2.4 on Defence Economics.[165]

An alternative military perspective on entanglement by self-restriction is provided by Wallace, who has analysed the impact of alliances on the military strategy with an emphasis on alliances where e.g. the U.S. is one of the member states. He theorised that less powerful states, which are members in an alliance with a major power, like the U.S., might be influenced in their national military strategy. Based on a quantitative analysis, Wallace concluded that the more institutionalised an alliance is, the more do its members states orient themselves in their military strategy towards the U.S.[166] Putting these considerations in a nutshell, the interrelationship between the national and alliance action levels have important connotations for the implementation of a joint deterrence and defence posture. They are more thoroughly reflected in Chapter 3.

The danger of entanglement rests in its latent complicity, i.e., the boundedness of a state by its alliance commitments towards an ally, which pursues its own politico-military agenda which are potentially contradictory to one's own political interests. This has been an ongoing and highly political aspect that represents an almost classical factor for a state's intention to enter, retain or terminate an alliance membership. There are two noteworthy examples of the Euro-Atlantic region's past that reflect this very well. The first example is George Washington's farewell address of 1796, wherein he stressed that the U.S. should stay clear of 'permanent alliances'. That was interpreted in Thomas Jefferson's inaugural pledge as 'no entangling alliances'. Skipping the epistemological debate of the exact wording used by the two former Presidents and Founding Fathers of the U.S., the intention had been the same as the European powers have learned bitterly in the wake of World War I, wherein the *Central Powers* and *Entente* found themselves after the activation of several defence pact commitments. In order to circumvent any 'entanglements' from such lessons, states have developed evasive strategies such as using loopholes in alliance commitments or seeking alternative defence cooperation frameworks, which has in itself a potentially destabilising effect on the joint deterrence and defence posture.[167] Nothing reflects this fear of European allies more than the famous quote in reference of 'keeping the Americans in' by the first NATO Secretary General Lord Ismay.[168]

[165] Morrow, J. (1991): Alliances and Asymmetry: An Alternative to the Capability Aggregation Model of Alliances, pp. 907-913.
[166] Wallace, G. (2008): Alliances, Institutional Design, and the Determinants of Military Strategy, pp. 224-231 and 204 f.
[167] Beckley, M. (2015): The Myth of Entangling Alliances, pp. 7 f. and 12-22.
[168] NATO (n.a.): Origins – NATO Leaders, Hyperlink: https://www.nato.int/cps/en/natohq/declassified_137930.htm (Last visit: 21.07.2022).

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The sensitivity of this issue is, however, not limited to the forward-positioning of U.S. forces in Europe or the domain of strategic nuclear deterrence that the U.S. provides for its European allies. [169] It is this 'continuum' that connects the nuclear and conventional domain, which remains of key interest to European allies, namely the forward-deployment of non-strategic nuclear weapons and particularly those attributed to a nuclear sharing arrangement with European allies' military forces.[170] An analysis of the political and military relevance of those weapons for the non-nuclear NATO member states in the post-Cold War era is therefore conducted more intensively in Chapters 3 and 4.

2.2.2 Cooperative security as an additive concept to alliances

Cooperative security represents a special case in the classics of International Relations theory[171]. The term 'cooperative security' is often used synonymously with 'collective security'. This represents for more confusion[172] than clarity what cooperative security really means, as Mihalka had rightly pointed out.[173] Fortunately, there are definitions for 'cooperative security' available that enable a common understanding, how the term is understood in the scope of this dissertation. In a nutshell, a cooperative security encompasses a framework in which

> "[…] states agree to abide by certain norms and rules to maintain stability and, when necessary, band together to stop aggression. Stability – the absence of major war – is the product of cooperation." (Kupchan/Kupchan).[174]

The ultimate purpose of a collective security framework in the international system is the perseverance of peace in the international system through the most inclusive cooperation and trust-building measures between states. All member states participating in the collective security institution abide to commonly agreed provisions, *inter alia*, the renouncement of violent measures against another member state. Should a member state nevertheless use violent

[169] Thimm, J. (2018): NATO: US Strategic Dominance and Unequal Burden-Sharing Are Two Sides of the Same Coin, Hyperlink: https://www.swp-berlin.org/en/publication/nato-us-strategic-dominance-and-unequal-burden-sharing-are-two-sides-of-the-same-coin (Last visit: 19.07.2022).
[170] For a brief look on the topic of U.S. non-strategic nuclear weapons in Europe, see: Horovitz, L. (2014): Why do they want American Nukes? Central and Eastern European positions regarding U.S. nonstrategic nuclear weapons, pp. 73 f.; and: Pifer, S. (2011): Nuclear Weapons and Arms Control in Europe – Chapter 6, pp. 87-96. In: *Istituto Affari Internazionali (IAI) (eds.): European Security and the Future of Transatlantic Relations*.
[171] Two exemplary and particularly influential Classics of International Relations theories or 'schools' are introduced in chapter 2.3.
[172] For different meanings of the same term of 'collective security, compare: Ebegbulem, J. (2011): The Failure of Collective Security in the Post World Wars I and II International System, pp. 23 f. with e.g.: Permanent Representation of Germany to NATO (n.a): Cooperative security, Hyperlink: https://nato.diplo.de/nato-de/-/283466 (Last visit: 11.06.2022).
[173] Mihalka, M. (2005): Cooperative Security in the 21st Century, pp 113 f.
[174] Kupchan, C./Kupchan, C. (1995): The Promise of Collective Security, pp 52 f.

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means, all member states would be obliged to condemn the aggressor and do anything possible in order to ensure the cessation of hostilities. This would also allow for, among other diplomatic means or economic sanctions, encompassing direct military support to the defending state and to deny the aggressor state any spoils of war. This should ensure that violent acts, such as an inter-state war, are no viable options in state-to-state relations.[175]

Once a collective security framework has been established, the participating member states can make use of this format in different ways. These could encompass different forms of defence cooperation from lower to higher intensity. Rival states could, for example, agree on particular confidence and security-building measures such as the exchange of information on defence capabilities, cooperation on the combat against illicit arms trafficking and prevention of the proliferation of 'weapons of mass destruction' (WMD).[176]

Particular attention should be given to treaties on arms control. In the Cold War era, these treaties represented a key confidence and security-building measure between the two superpowers in order to reduce the likelihood of military conflict. The relevance of arms control treaties built on three arguments: (1) the chance to reduce uncertainty about the rival's military capabilities, (2) the establishment of arms limitations, thereby potentially enabling reductions on defence expenditures, and (3) opportunities for an agreement on mutual disarmament steps.[177] Since cooperative security frameworks are intended to be most inclusive in terms of membership, any state (regardless of its political positioning) could become a participating member. This also enables political neutral states, e.g., Finland[178], to join cooperative security frameworks.

From a historical perspective, there had been at least two attempts at establishing cooperative security through global institutions. The first (failed) attempt was the League of Nations that was created as an international response to the massive destruction caused by World War I with the cause to de-incentivise 'war as a policy option'. Following the end of World War II, an adjusted cooperative security framework, namely the United Nations (UN), was created once

[175] Andreatta, F. (1996): Collective Security. Theory and Practice of an Institution for Peace in the XX Century, pp. 42-52, Hyperlink: http://etheses.lse.ac.uk/id/eprint/1434 (Last visit: 07.05.2022).

[176] For an exemplary overview of the scope of confidence and security-building measures of the OSCE Forum for Security Co-operation, see: OSCE (2020): Factsheet of the OSCE Forum for Security Co-operation, 21.01.2020, Hyperlink: https://www.osce.org/forum-for-security-cooperation/77535 (Last visit: 18.02.2022).

[177] Craft, C. (2000): An analysis of the Washington naval agreements and the economic provisions of arms control theory, pp. 129-131.

[178] Finland's particular political neutrality stance – known as 'Finlandisation' – rose to prominence in the 1960s and was deeply connected to the policies of then Finnish long-term president Urho Kekkonen. Important pillars of Kekkonen's foreign policy of 'Finlandisation' were (1) support of cooperative security, which eventually lead to the 1975 Helsinki Accords of the CSCE, (2) promotion of a nuclear weapon-free zone in the arctic north, and (3) support of UN peace-keeping operations, see: Singleton, F. (1981): The Myth of 'Finlandisation', pp. 270 f. and 283-285.

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again. The UN has had and continues to have its own structural 'pitfalls' in its decision-making structure with the fixed position of the victorious states of World War II as perpetual veto powers in the UN Security Council and the political challenge by ideological blockades between the individual veto powers, such as the democratic West - socialist East divide, but these are beyond the scope of this dissertation.[179]

The cooperative security framework received a further institutionalisation in the 1970s through the creation of the Conference on Security and Co-Operation in Europe (CSCE), which eventually evolved to the Organisation on Security and Co-Operation in Europe (OSCE) in December 1994. The specific purpose of this regional cooperative security framework was to provide a platform for discussions and negotiations between democratic West and the post-socialist East on politico-military, economic and environmental and human rights.[180]

Collective security arrangements are not limited to the dedicated UN and OSCE frameworks, but can surprisingly be found in a military alliance, such as NATO, as well. With the changes in the international system following the end of the Cold War and the diversification of the potential threats, NATO opted for active cooperative engagements with non-NATO countries in order to enhance the comprehensive security of its member states.[181] Through the inception of NATO's partnership for peace programme, a number of previously declared neutral countries, such as Finland and Sweden in 1994[182] or Austria in 1995[183], launched a closer defence cooperation with NATO and its allies.

A peculiar manifestation of cooperative security came to existence through the 1997 NATO-Russia Founding Act. In a press release by the U.S. White House back then, the agreement between the transatlantic alliance and non-member Russia had been called

> "[…] the basis for an enduring and robust partnership between the Alliance and Russia, one that can make an important contribution to Europe's security architecture in the 21st century." (White House, Office of the Press Secretary)[184]

[179] Ebegbulem, J. (2011): The Failure of Collective Security in the Post World Wars I and II International System, pp. 23-29.
[180] For a quick overview of the OSCE, see: OSCE (2019): What is the OSCE?, pp. 1-8, Hyperlink: https://www.osce.org/files/f/documents/d/d/35775_9.pdf (Last visit: 06.06.2022).
[181] NATO (2014): Collective Defence and Common Security. Twin Pillars of the Atlantic Alliance, pp. 1-6, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2014_06/20140606_140602-peg-collective_defence.pdf (Last visit: 07.05.2022).
[182] For further reference: NATO Relations with Finland, April 2022, Hyperlink: https://www.nato.int/cps/en/natohq/topics_49594.htm (Last visit: 12.05.2022); NATO Relations with Sweden, April 2022, Hyperlink: https://www.nato.int/cps/en/natohq/topics_52535.htm (Last visit: 12.05.2022).
[183] NATO Relations with Austria, April 2022, Hyperlink: https://www.nato.int/cps/en/natohq/topics_48901.htm (Last visit: 12.05.2022).
[184] U.S. White House (1997): NATO-Russia Founding Act. Factsheet released by the Office of the Press Secretary, Washington, DC, 15. May 1997, Hyperlink: https://1997-2001.state.gov/regions/eur/fs_nato_whitehouse.html (Last visit: 11.06.2022).

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In this sense, collective security has become of high relevance to the transatlantic alliance of the Post-Cold War era in general as well as particularly for its relations to Russia. Against this backdrop, NATO begun to overshadow the OSCE as regional collective security institution in the Euro-Atlantic region at the same time as Russia underwent grave internal economic and politico-military crises. Nevertheless, both NATO's member states as well as Russia has had considerable difficulties to manage their politico-military relations through the institutional structure that was put in place in NATO, such as the 1997 NATO-Russia Founding Act.[185] While the research question focusses on NATO's deterrence and defence posture which is not an instrument of cooperative security, NATO's member states and Russia are likewise affect by various cooperative security arrangements that persisted since the Cold War or were created throughout the post-Cold War era. Relevant aspects of cooperative security are therefore to be addressed from an empirical perspective in subchapter 4.2 in this dissertation.

2.3 Selected theories of International Relations

Explaining state behaviour, national decision-making and state action at the international level is the core domain of the discipline of International Relations (IR), in which numerous theories were created and refined over the last decades. This variety of research contributions often offer an interdisciplinary perspective by integrating elements from other research subjects, such as law or economics.[186] The contemporary IR discipline is known for its set of 'grand theories' that try to give comprehensive explanations on the international system. Since this doctoral thesis focuses on the nation-states, some IR theories need to be omitted from the outset, because those opted to include further acting units, such as non-state social groups. The IR discipline is dedicated to answering the various questions pertaining to foreign policy, state-to-state relations, integration in international and supranational bodies, among others. Since coverage of all potential state-focussed theories are beyond the scope of this PhD thesis, two of the most prominent IR schools – namely Neorealism and Neonstitutionalism – are used as points of reference.

Both theoretical schools share ontological and epistemological assumptions[187], which are hereby jointly displayed, before taking a deeper look into the specifics of each school. The basic

[185] MacFarlane, S. N. (2001): NATO in Russia's Relations with the West, pp. 281-293.
[186] For a quick reference to the IR discipline with a non-exhaustive overview on its theoretical contributions, see for example: Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, pp. 123-224.
[187] For a short overview on the tenets that modern IR theory, see: Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, pp. 108-118.

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assumptions that Neorealism and Neoinstitutionalism share are: (1) States are rational actors, thus maximising the amount of military security as key political goal in conjunction with this doctoral thesis, (2) states assume that all other states have a military capability for realising their own national goals at their disposal, and (3) the intention of other states is not precisely known, thus fomenting a security dilemma for national policy-makers. What distinguishes both theories are, *inter alia*, the highlighted role of 'great powers' in Neorealism and the role of institutions as promoter of inter-state cooperation in Neoinstitutionalism.[188] From a meta-theoretical perspective, both Neorealism and Neoinstitutionalism are system theories, i.e. they focus their analysis on the structure of the international system, and consider it as anarchic, i.e., there is no central authority to enforce laws or agreements amongst states.[189] Cooperation amongst states offers a particular challenge, because there is no possibility of legally enforcing cooperation and cheating represents a potential strategy for the cooperating states.[190] Therefore, both theories have developed their own set of assumptions and hypotheses about state behaviour under such conditions of the international system. The intention of the subchapters 2.3.1 and 2.3.2 is therefore to gain added value for the analysis of the deterrence and defence-related research question.

2.3.1 Neorealism

From the various scientific contributions that constitute International Relations (IR) theory, Neorealism (also known as Structural Realism) is widely taught as the first 'school of thought' in university classes on modern IR theory[191]. It represents the first contemporary system-focussed theoretical framework that many later schools such as Neoinstitutionalism have connected to by assimilating certain core assumptions about the properties, actors and structure of the international system from Neorealism.[192] There are of course further and more recent 'schools of thought', such as Constructivism[193] that reject the core assumptions of

[188] Slaughter, A.-M. (2011): International Relations, Principal Theories, pp. 1-3, Hyperlink: https://scholar.princeton.edu/sites/default/files/slaughter/files/722_intlrelprincipaltheories_slaughter_20110509zg.pdf (Last visit: 31.07.2022).
[189] Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, pp.127-134 and 145-148; as well as: Jervis, R. (1999): Realism, Neoliberalism, and Cooperation: Understanding the Debate, pp. 42-44.
[190] Hellmann, G./Wolf, R. (1993): Neorealism, Neoliberal Institutionalism, and the Future of NATO, pp. 7 f.
[191] For more details on the history of Neorealism, including references to its 'predecessor' Realism, see: Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, pp. 124-127.
[192] Mearsheimer, J. (1995): The False Promise of International Institutions, p. 7.
[193] Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, pp. 197-220; and: Kinacioglu, M./Gürzel, A. (2013): Turkey's Contribution to NATO's Role in Post-Cold War Security Governance: The Use of Force and Security Identity Formation, pp. 591 f.

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Neorealism[194] altogether, but as previously stated in the introduction to IR theory, these are not further pursued in this dissertation.

The first contributions in the field of which would be known as Neorealism today came from a number of scholars from the late 1950s onward. Particularly influential was Waltz, who had marked the discipline early on. Waltz proposed the idea of three images, wherein the third image – the relationship between 'international anarchy' and international conflict cannot be ignored by any state in its foreign policy making.[195] Taking into account the central assumptions regarding the international system that Neorealism is based upon[196], the essential motivation of a state in Neorealist thinking is safeguarding one's own national security by ensuring national survival in a system of self-help.[197] In order to pursue this goal, states rely on their capabilities that can be considered as 'power' that a state wields. According to Waltz,

> "Power in neorealist theory is simply the combined capability of a state. Its distribution across states, and changes in that distribution, help to define structures and changes in them […]." (Waltz)[198]

For Neorealism, the structure of the international system based on self-help does not, however, not exclude the chance for inter-state cooperation, particularly for those states that are not considered 'great powers'[199], which tend to choose from different forms of interstate-cooperation.[200] Conceptually, Walt proposed two different policy choices for states that face a state with more capabilities at its disposal in the international system. One policy choice reflects cooperation with other states in order to 'balance' a more potent state. The alternate policy choice instead goes into the opposite direction, namely 'bandwagoning' with the more potent state. The intention behind choosing compliance with the more potent state is that the weaker state might see an opportunity to deflect a potential attack by the stronger state. Entering either

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[194] Jervis, R. (1999): Realism, Neoliberalism, and Cooperation: Understanding the Debate, pp. 43 f.

[195] The first image is the relationship between human behaviour and international conflict; the second image is the relationship between social order and international conflict. Compare: Krell, G. (2004): Kapitel 6 – Realismus. pp. 161-166. In: *Krell, G. (ed.): Weltbilder und Weltordnung. Einführung in die Theorie der Internationalen Beziehungen*.

[196] For a brief overview, the basic assumptions of Neorealism are: "The system is anarchic, great powers possess some offensive capabilities, no state can be certain of others' intentions, survival is the primary goal, and actors are rational […]" (Snyder), see: Snyder, G. (2002): Mearsheimer's World-Offensive Realism and the Struggle for Security: A Review Essay, p. 154.

[197] Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, pp. 127 f. and p. 132.

[198] Waltz, K. (1990): Realist Thought and Neorealist Theory, p. 36.

[199] The descriptive term 'great power' has been one of the most prominent parts under consideration in Neorealism, but is rather elusive when it comes to defining it. While it is strongly interconnected with the distribution of capabilities, there is neither a strictly defined threshold nor a singular category along which a 'great power' forms, e.g. see the case study on France as 'great power' in the aftermath of World War 2: Heimann, G. (2015): What does it take to be a great power? The story of France joining the Big Five, pp. 185-206.

[200] Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, pp. 133-136.

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a state of vassalage of the more potent state or by negotiating a non-aggression pact is a potential strategy known as 'buck-passing'.[201] Both strategies can be considered a state's response to the security dilemma of the international system. Interestingly, Neorealists have acknowledged alternative approaches to the security dilemma, such as the idea of collective security that has been introduced in Chapter 2.2.2. However, the theory drew its lessons from the history of the first half of the 20th century and considered collective security formats as obsolete concepts that cannot restrain the effects that rapidly advancing military technology brought to international politics.[202] Taking into account that defensive military alliances, as laid out in the previous chapters, intend to deter a third state from attacking the allied states, there is not much overlap with the intentions of the 'bandwagoning' strategy. Instead, it is the 'balancing strategy' that represents the theoretical explanation with the best fit regarding the explanation of defensive alliance's existence from a Neorealist's point of view.

Initially, the 'balancing' strategy of two or more states against one or more third states had been based on 'Balance of Power', which suggests that states in the international system are interested in maintaining the status quo in the power distribution amongst all states. Rising powers that challenge this delicate power distribution would subsequently be offset by the formation of alliances, thus re-balancing the international system.[203] As an alternate approach to the 'Balance of Power' approach, Walt proposed a 'Balance of Threat', in which he argued that the existence of strong capabilities in one state does not necessarily pose a challenge for other states. The intention for balancing rather depends on the aggressiveness of that state's policies in question. Subsequently, Walt identified four criteria that play a key role in the political decision-making process through which a state prioritises another state as a threat: (1) the level of aggregate power of that other state, (2) the proximity of that state the own one, (3) the offensive capability of the other state, and (4) the offensive intentions of that other state.[204] In regard to the conceptual distinction, Walt argued that 'Balance of Power' has been limited purely to difference in distribution of capabilities amongst states, whereas 'Balance of Threat' includes the intention of one state's using its capabilities to the detriment of another state. As such, Walt perceived 'Balance of Threat' to be a more refined form that includes 'Balance of Power', but moves the analysis of state behaviour to a more abstract level that cannot be explained by numerical comparisons only.[205] The operationalisation is subsequently more

[201] For the political strategies of balancing versus bandwagoning, see: Walt, S. (1985): Alliance Formation and the Balance of World Power, pp. 5-8.
[202] Niou, E./Ordeshook, P. (1991): Realism versus Neoliberalism: A Formulation, pp. 482 f.
[203] Dwivedi, S. (2012): Alliances in International Relations Theory, p. 228.
[204] Walt, S. (1985): Alliance Formation and the Balance of World Power, pp. 8-13.
[205] Walt, S. (1988): Testing Theories of Alliance Formation: The Case of Southwest Asia, pp. 279-284.

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complicated if a group of states do not consider a specific potential aggressive third state as a rival.[206]

At this point, it should be noted that Neorealism provides an interesting *paradoxon* between the theoretical assumption of the international system as s system of self-help and the empirical evidence that states quite often create alliances for balancing purposes. A potential explanation might be that

> "[…] Neorealist theory assumes that states are at a minimum seeking their own survival and preservation and at a maximum striving for universal domination within the international system. Therefore, states seek to increase their military strength and economic capability (inside) and to strengthen and enlarge their alliances (outside). Power is assumed to be the most important political means in international politics, used to achieve the state's aims. There is a clear hierarchy of state goals with security (high politics) on top." (Spindler)[207]

This definitory spread between 'national survival' and 'universal domination' in state's national policy-making has obviously drawn critique from the academic community due to its randomness of explaining different state behaviours.[208]

In order to understand this epistemological divide, a theoretical overview by Lobell provides insight on (at least) two distinctive variants of Neorealism: (1) *Defensive neorealism*, as introduced by Waltz in 1979 and further refined by a number of researchers in the decades after, and (2) O*ffensive Neorealism*, developed in 2001 by Mearsheimer as a response to Neoinstitutionalist critique.[209] The key difference between *Offensive* and *Defensive Neorealism* revolves around the state's response to the anarchy of the international system. *Offensive Neorealism* argues that anarchy in the international system provides incentives for an aggressive expansionist policy stance in order to ensure national survival, while *Defensive Neorealism* reasons that the security dilemma inherent in the anarchic international system, including, *inter alia*, inter-state rivalry based on misperception of the other states' intentions, should lead to a more self-restraint policy stance that preserves the *status quo*.[210]

Assuming that states in the international system as a system of self-help are security maximisers, Mearsheimer suggested that the formation and stability cooperation under

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[206] This is covered in more detail in Chapter 3 from a theoretic point of view and in Chapter 4 from the empirical perspective.

[207] Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, p. 128.

[208] Krell, G. (2004): Kapitel 8 – Institutionalismus. pp. 172 f. In: *Krell, G. (ed.): Weltbilder und Weltordnung. Einführung in die Theorie der Internationalen Beziehungen*.

[209] Lobell, S. (2017): Structural Realism/Offensive and Defensive Realism. In: *Oxford Research Encyclopedias*, Hyperlink: https://oxfordre.com/internationalstudies/view/10.1093/acrefore/9780190846626.001.0001/acrefore-9780190846626-e-304 (Last visit: 06.02.2022), pp. 1-3.

[210] Taliaferro, J. (2001): Security Seeking under Anarchy: Defensive Realism Revisited, pp. 128-132 and 134-136.

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Neorealism in general is possible when the distribution of the benefits gained from that cooperation reflects the distribution of power of the respective states and when mitigation measures for defection from the cooperation are established. This mistrust is thus not limited to the external dimension posed by intention of third states for aggression, but includes the internal dimension of intra-alliance relations, wherein allied states might feel inclined to use windows of opportunity for gaining relative advantages, e.g. by defecting from cooperation; again another security dilemma.[211] The dichotomy between relative versus absolute gains that states acquire by cooperation is one of the dividing lines between Neorealism and its 'offspring' Neoinstitutionalism and decisive for the likelihood of inter-state cooperation.[212]

Considering that the dyadic conflict between the Western states of NATO and the Eastern states of the Warsaw Pact was an archetypical example for the 'Balance of Threat' theory, the post-Cold War era with the dissolution of the Soviet Union and the end of the Warsaw Pact pose a certain challenge for the continuation of a military alliance, such as NATO. An orthodox approach from a Neorealist's perspective could be the referral to the 'Balance of Power' theory, wherein the nuclear-armed and conventionally powerful primary successor of the Soviet Union, mainly Russia, represents one of the powers that states in the Euro-Atlantic region define their politico-military policy posture against. However, this is not a clear-cut response to the question, since two different mutually exclusive descriptions have taken hold of the academic and professional communities, when the geopolitical properties of the post-Cold War era are examined. By the early 1990s, the perspective of a 'U.S. American Hegemony' in the international system got considerable traction.[213] With the rise or return of further (perceived or potential) great powers, such as Russia and China, the international system is increasingly seen as a 'multipolar' one, not unlike to the international system of the 19th century.[214]

As an alternative to the orthodox theoretical approach above, more pragmatically minded Neorealists have provided another rather simple explanation why NATO persisted throughout the post-Cold War time. NATO's continued existence had been

> "[…] mainly a means of maintaining and lengthening America's grip on the foreign and military policies of European states. […] The survival and expansion of NATO tell us much about American power and influence and little about institutions as multilateral entities. The ability of the United States to extend the life of a moribund institution nicely illustrates how international institutions are created and maintained by stronger states to serve their perceived or misperceived interests." (Waltz)[215]

[211] Mearsheimer, J. (1995): The False Promise of International Institutions, pp. 12 f.
[212] Jervis, R. (1999): Realism, Neoliberalism, and Cooperation: Understanding the Debate, pp. 45-47.
[213] Waltz, K. (2000): Structural Realism after the Cold War, pp. 27-32.
[214] Blagden, D. (2015): Global multipolarity, European security and implications for UK grand strategy: back to the future, once again, pp. 333-342.
[215] Waltz, K. (2000): Structural Realism after the Cold War, p. 20.

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Whatever the ontological truth of these explanations for the continued existence of a military alliance after overcoming its natural adversary is, the geostrategic ideas expressed through both terms have had and continue to have an impact on the behaviour of states in the international system.[216] Thus, while Neorealism as IR theory had been strongly aligned with the strategic thinking of the Cold War era, it remains to be relevant for the post-Cold War era IR discipline, because despite numerous states undergoing revolutionary domestic changes as a result of the dissolution of the socialist Eastern bloc, the international system *itself*, i.e. in terms of unitary states and their interaction within the remit of the international system, did however not change at all. Likewise, alliances have still an important role for the states in the international system after 1991, when the number of states together with the uncertainty regarding their individual motivations as well as their respective military capabilities began to grow.[217]

As shown in this section, Neorealism offers a plethora of scientific 'hooks' to connect it with the research question of this dissertation. Unfortunately, there are a number of critical arguments that might question the validity of the theory. From a historical perspective, Schroeder questioned the claim of Neorealists that this theory provides a sound model for explaining international history in terms of patterns and outcomes. Subsequently, he proved his point by identifying other strategies beside balancing and bandwagoning that were applied by states in the past, such as hiding from a threat or transcending a threat through an institutional arrangement. In addition, Schroeder added some interesting insights from cross-referencing the two World Wars with the assumption of Neorealism as a system of self-help with the tendency for balancing instead of bandwagoning. This historical perspective showed that states have chosen from such a variety of strategies that Neorealism, which might consider the summary of these strategies as part of the system of self-help, loses its theoretical predictive power.[218] Zagare and Kilgour have criticised Neorealism for its rigidity in regard to the general assumption that all states of the international system are driven by the same motivation or end. Through empirical examination of numerous conflicts, this Neorealist assumption can often be refuted, because one side wants to achieve a change of the *status quo*, while the other desires to retain it.[219] In a further critical review, Legro and Moravcsik have made an extensive effort to collect and summarise the various issues pertaining Neorealism theory, such as the theoretical contradictions between the role of 'perceived state intentions' from 'Balance of Threat' theory

[216] Simes, D. (2014): Reawakening an Empire, pp. 5-15.
[217] Waltz, K. (2000): Structural Realism after the Cold War, pp. 5 f.
[218] Schroeder, P. (1994): Historical Reality vs. Neo-Realist Theory, pp. 111 f., 115-120, 122-124, and 129 f.
[219] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 133-135.

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with the material capabilities as part of traditional Neorealism. Another critical point might be the likelihood of alliance defection by a state in order to secure relative gains over absolute gains.[220] Further critique can be drawn from the view that there is apparently missing conceptual clarity between the concepts of Neorealism and another competing IR theory, namely Neoinstitutionalism. [221] This proves that IR theories once created are not fixed, but undergo a continuous evolution in order to explain changes in the international system. Thus, mutual exchange of ideas between scholars of each 'grand theory' as well as reaction to explanations by new competing theories should be considered the norm rather than an exception. For the research question, such 'meta-theoretical' debates are however of little value and not further pursued. Instead, Neorealism offers some interesting take-aways for state behaviour from the IR discipline for this doctoral thesis, such as the state's goal of survival through 'Balance of Threat' approach by forming and retaining alliances.

2.3.2 Neoinstitutionalism

Before the mid-1970s, the IR discipline was dominated by three 'grand theories': Realism (and its system-theoretical 'reinvention' Neorealism), Liberalism and Marxism. With the manifestation of the first theoretical contributions of what is known today as Neoinstitutionalism[222], this new theoretical school has challenged one of its parental theories – namely Neorealism – regarding the extend of cooperation between states through international institutions.[223] As briefly touched upon in the introductory chapter, Neoinstitutionalism shares many of the Neorealist basic assumptions, such as the states as rational actors, the focus on capabilities, the security dilemma caused by limited information about the intention of other states, and the general assumption on the anarchy of the international system. Proponents of the

[220] Legro, J./Moravcsik, A. (1999): Is Anybody Still a Realist?, pp. 25-28, 36-38, and pp. 47 f.
[221] Glaser, C. (2003): Structural Realism in a more complex world, pp. 409-412.
[222] Neoinstitutionalism borrowed the basic assumptions of Neorealism, considerations from Mitrany's Functionalism theory, and ontological expectations about the role of institutions such as international law and international organisations from Liberal theory. In conjunction with its diverse content, Neoinstitutionalism has also been called 'Neoliberal Institutionalism' or 'Rational Institutionalism'. For simplicity, 'Neoinstitutionalism' is used as the term of reference for this theory throughout this PhD thesis. See: Krell, G. (2004): Kapitel 8 – Institutionalismus. pp. 240-242. In: *Krell, G. (ed.): Weltbilder und Weltordnung. Einführung in die Theorie der Internationalen Beziehungen*; and: Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, pp. 142-145.
[223] Exemplary of such a discussion was initiated by Mearsheimer's essay on 'The False Promise of International Institutions' that prompted, *inter alia*, Keohane and Martin to respond with 'The Promise of Institutionalist Theory'. Likewise, Mearsheimer returned the favour through a broadside on his critics in general and by questioning the added value of the latest iteration of Neoinstitutionalist theory in particular. Compare: Mearsheimer, J. (1995): The False Promise of International Institutions, pp. 5-49; Keohane, R./Martin, L. (1995): The Promise of Institutionalist Theory, pp. 39-51; and: Mearsheimer, J. (1995): A Realist Reply, pp. 82-93.

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theory, such as Keohane, argue that the focus on security-related aspects in Neorealism is exaggerated and overly dominant in its analysis of international politics. Furthermore, Keohane suggested to include further elements to the structural analysis of the international system, particularly the concepts of interdependence and international institutions. Differentiating Neoinstitutionalism from its 'parent theory' is not as simple as it seems; the theory can also be called "modified structural realism" (Spindler).[224] Neoinstitutionalism has therefore focussed in particular on overcoming the security dilemma through institutions; a phenomenon that Neorealism has considered just as an expression of power and interest by states and a 'false promise' (Mearsheimer) for solving high-political security and defence challenges in the international system.[225] In this sense, Neoinstitutionalism brought the distinctive concept of international (economic) interdependence as a new element into IR analysis. Starting with the concept, the term 'interdependence'

> "[…] refers to situations in which actors or events in different parts of a system affect each other." (Nye)[226]

The early beginnings of interdependence had a strong focus on the economic realm, because researchers assumed that with the increase in inter-state trade interactions, the likelihood of a conflict between both trading states diminish as both would consider the loss of resources in trade and through war damage as a 'double disincentive'. Empirical evidence for this argument has been drawn from a comparison of the trade relations between European states in the 1920s with the economic protectionism of the 1930s. Interestingly, Neorealists have interpreted such economic interdependence rather as an incentive for conflict, because the dependency on another state's resources would tempt a state to use aggression in order to avoid losing economic wealth as a basis for its long-term security.[227] From a conceptual perspective, interdependence consists of four elements: (1) the source of interdependence, (2) the benefits from interdependence, (3) the costs of interdependence, and (4) the symmetry of interdependence.[228] With a view to the research question, the source of interdependence should be limited to a military alliance, while benefits arising from interdependence inside that military alliance should be an increase in military security for its member states. Having said that

[224] Spindler, M. (2013): International Relations. A Self-Study Guide to Theory, pp. 145-147.
[225] Stein, A. (2008): Neoliberal Institutionalism, pp. 206-209. In: *Reus-Smit, C./Snidal, D. (eds.): The Oxford Handbook on International Relations*.
[226] Nye, J. (1993): Chapter 7 – Interdependence and Power, p. 161. In: *Nye, J. (ed.): Understanding international conflicts: An introduction to theory and history*.
[227] Copeland, D. (1996): Economic Interdependence and War: A Theory of Trade Expectations, pp. 5-8.
[228] Nye, J. (1993): Chapter 7 – Interdependence and Power, p. 161-168. In: *Nye, J. (ed.): Understanding international conflicts: An introduction to theory and history*.

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interdependence and institutions are the two main contributions from Neoinstitutionalism, it might be useful to understand where the theory locate military alliances in.

In line with Keohane, (military) alliances are essentially institutions[229] that provide a considerable value for its member states:

> "Institutions, whether alliances or international economic regulatory agencies, shape the costs, information, even the preferences, and hence the actions of their constituent members." (Krebs)[230]

Summarising the benefits of alliances, they might, *inter alia*, offer (1) an opportunity of inter-state transactions, either immaterial (cooperative contacts from working level to senior leadership) or material (e.g. arms trade), (2) negotiation of common positions, including alliance-third state relations, (3) clustering of multiple issue areas (e.g. by including arms control or civil crisis management), and (4) increase of transparency of the individual member state's intentions, thus lowering the threshold of mistrust amongst the allied states.[231]

Coming back to the four elements of interdependence – the costs of interdependence and the symmetry of interdependence – should be further reflected in a joint manner at this point.

Military alliances, such as NATO, can usually be considered restricted international institutions because the founding member states have agreed on certain policies to control accession to this institution. This is intentional from the outset as third states might pursue a strategy to join an alliance in order to disrupt it from within.[232] Further important elements are the scope of the international institutions and the strength of multilateral policies as agreed by member states of the institution. The scope of military alliances can be considered fixed to deterrence and defence posturing[233] in this doctoral thesis. In regard to the strength of multilateral policies, it is noteworthy that Keohane limited his examples for multilateral polices (he called it multilateral regulations) to trade organisations or the European institutions, whereas alliances might adopt

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[229] Institutions has been used as a summary term for numerous research objects from IR theory, such as international organisations, treaties, regimes, conventions, norms and rules akin to international law, etc. For the research question, the traditional approach of using 'international organisation' as analogon to 'international institution' is applied, see: Duffield, J. (2007): What Are International Institutions?, p. 3.

[230] Krebs, R. (1999): Perverse Institutionalism: NATO and the Greco-Turkish Conflict, p. 347.

[231] Krebs, R. (1999): Perverse Institutionalism: NATO and the Greco-Turkish Conflict, p. 347 f.

[232] An interesting example of such disruptive intentions had been the Soviet Union's request to join NATO in 1954 (sic!), see: Roberts, G. (n.a.): Molotov's Proposal that the USSR Join NATO, March 1954, Hyperlink: https://www.wilsoncenter.org/publication/molotovs-proposal-the-ussr-join-nato-march-1954 (Last visit: 01.08.2022).

[233] This represents an axiomatic compromise in order to limit the research subject. Empirically, such a statement can quickly be questioned by referring to the ongoing debate on the potential duplication between EU and NATO, see for example: van Ham, P. (2000): Europe's New Defense Ambitions: Implications for NATO, the U.S., and Russia, Hyperlink: https://www.marshallcenter.org/en/publications/marshall-center-papers/europes-new-defense-ambitions-implications-nato-us-and-russia/europes-new-defense-ambitions-implications-nato-us (Last visit: 01.08.2022).

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policies that are considered binding not in legal but in political terms. An example of one such particular and highly politicised internal policy 'agreement' of the transatlantic alliance was the 2% defence investment pledge. While the U.S. administration under former President Trump administration's comments on NATO is beyond the timeframe of this dissertation and not a very good showcase from a general point of view[234], the long-time perception that (particularly European) allies are 'free-riding' on the American taxpayer's money and the subsequent institutional critique from the U.S. administration about NATO show two aspects: (1) As explained above, the strength of the institution rests upon the commitment of its member states to implement mutually agreed policies[235], and (2) the level of cohesion of a military alliance with a view to external signalling to third states as well as internal signalling in regard to the expectations 'what to get from the alliance in case of crisis'[236].

For a historical example how 'strong' the effects of military alliance's mutually agreed and implemented policies can be, one must only look at the Tehran, Yalta and Potsdam Conferences of the three-partite allied wartime coalition in World War 2 which have proven two important aspects. First, leader's summits play an essential role as highest decision-making authority for an alliance, and second, agreements found on such summits can heavily influence the geostrategic environment of the Euro-Atlantic region (and beyond for that matter).[237]

It should also be noted that strength of implementing policies represents also a gauge for the participating member states on the level of trust in their allies. Taking the historical example of the World War 2 wartime coalition, fear amongst allies about defection in terms of separate peace treaties between single allies and the axis powers were existent[238]. Moving to a more

[234] The erratic communication strategy of the Trump administration in regard to NATO can be followed through two news articles from January and April 2017. Compare: BBC (2017): Trump worries Nato with 'obsolete' comment, 16.01.2017, Hyperlink: https://www.bbc.com/news/world-us-canada-38635181 (Last visit: 01.08.2022) and BBC (2017): Trump says Nato 'no longer obsolete', 12.04.2017, Hyperlink: https://www.bbc.com/news/world-us-canada-39585029 (Last visit: 01.08.2022).

[235] Keohane uses the term 'multilateral regulation' with its two subvariants 'policy integration' and 'institutional integration'. The author argues that regulation should be more than international law or common policies of a supranational body. In this sense, inter-state agreement on common positions could be seen as a regulation 'in kind'. Compare: Keohane, R. (1990): Multilateralism: An Agenda for Research, pp. 750-759; with the example of NATO's 2% defence expenditure pledge, see: Kamp, K.-H. (2019): Myths Surrounding the Two Percent Debate – on NATO defence spending, p. 2 and 4, Hyperlink: https://www.baks.bund.de/sites/baks010/files/working_paper_2019_9.pdf (Last visit: 01.08.2022).

[236] As shown under the 'entanglement' argument in subchapter 2.3.1, members of an alliance are able to deter third states from attack and restrain allies from pursuing aggressive strategies at the same time, which provides a baseline cohesion of an alliance, i.e. the prospect of neither going to war with a third state or to be dragged into an undesired conflict on behalf of an ally. See: Fang, S./Johnson, J./Leeds, B. (2014): To Concede or to Resist? The Restraining Effect of Military Alliances, pp. 775-779.

[237] Brown, T. (2020): Tehran, Yalta and Potsdam: Three wartime conferences that shaped Europe and the world, Hyperlink: https://lordslibrary.parliament.uk/tehran-yalta-and-potsdam-three-wartime-conferences-that-shaped-europe-and-the-world/ (Last visit: 02.08.2022).

[238] For an excursive historical look on that matter, see: Mastny, V. (1972): Stalin and the Prospects of a Separate Peace in World War II, pp. 1365-1388.

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modern example, such internal danger that allies might defect from alliances like NATO if one considers the 1966 withdrawal of France from NATO's military command structure.[239] In order to ensure a low level of defection by member states from jointly agreed policies, NATO has since its inception been more than just a military alliance:

> "NATO is a security management institution [as well], which has always sought to deal only with external threats, but also with problems of mistrust and misunderstandings among its members." (Gheciu)[240]

With a view to the changed geopolitical conditions of the post-Cold War era, Neoinstitutionalists have made a strong point by referring to the further added value of the transatlantic alliance in regard to trust-building, cooperation and integration in e.g. NATO's Military Command structure that was to include the newly independent states in Eastern Europe following their desired accession to the transatlantic alliance.[241] Institutionalist theory suggests that this decision by member states is rational: There have been made considerable investments (sunk costs in economic terms) by member states to enable the transatlantic alliance to cope with various challenges through its dual political-military structure. Therefore, incentives for terminating NATO and launching a single new unprobed security arrangement for the post-Cold War era seemed not very logical from a member state's perspective.[242] In that sense, national commitment to agree and implement the alliance policies is rather a foreign policy alliance than a military alliance. A system perspective can be drawn from the level of cohesion that an alliance employs in regard to a specific politico-military challenge.

As exemplary cases, cohesion-building of a military alliance can best be shown by a brief look at the joint military operations that naturally require consensus in order to become NATO military operations. The 1999 Kosovo air campaign could be taken as an interesting example of the difficulty of aligning an increasing number of member state's political positions behind a joint NATO agreement; in this case for a crisis intervention operation. In absence of a singular dominant military threat, such as the Soviet Union and Warsaw Pact, the NATO allies were able to agree on a least common denominator (i.e. halting atrocities by Serbian troops against the Kosovo Albanians), but member states were not able to provide clear guidance on the military objective and a subsequent military strategy to attain the objectives, as U.S.

[239] De Gaulle's withdrawal had been mostly reverted in 2009 by then-President Sarkozy. Compare: Wenger, A. (2004): Crisis and Opportunity, pp 25-40; and: Müller-Brandeck-Bocquet, G. (2009): France's New NATO Policy: Leveraging a Realignment of the Alliance?, pp. 98-102.
[240] Gheciu, A. (2005): Security Institutions as Agents of Socialization? NATO and the 'New Europe', p. 975.
[241] Gheciu, A. (2005): Security Institutions as Agents of Socialization? NATO and the 'New Europe', p. 975 f.
[242] McCalla, R. (1996): NATO's persistence after the Cold War, pp. 461-469.

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Government Accountability Office reported.[243] A noteworthy failure of cohesion-building had been the pretext of the second Iraq War of 2003 that separated the European allies along the fault line of the Cold War in an 'Old Europe' in the West with the reserved states of Germany and France at its core and a 'New Europe' in the East that were supportive of the U.S. efforts to confront Iraq militarily.[244] As in the context of the Kosovo operation, the NATO allies were not in disagreement over the general obligations of Iraq to comply with UN Security Council resolutions (UN Security Council Resolution 1441 for disarmament with particular emphasis on weapons of mass destruction in this case), but how the resolution is implemented and what would happen, when Iraq fails to comply with it. The rest is history.[245] Ensuring cohesion in an alliance is therefore no minor task, because it relates input of member states through material and immaterial commitments to the output, in this dissertation's case deterrence and defence. In addition, and as shown above, the commitment to policy implementation and the level of cohesion of an alliance are strongly interconnected.

Lastly, when discussing Neoinstitutionalism, the role of relative versus absolute gains through cooperation in international institutions should be mentioned briefly. From the Neorealist perspective, states do cooperate only through a specific cooperation framework, when they can ensure maximisation of their utility through relative gains.[246] In comparison, Neoinstitutionalism assumes that states attempt to maximise absolute gains, thereby making cooperation more likely in a 'Neoinstitutionalist world'.[247] Since there is subchapter dedicated particularly to bargaining under the upcoming chapter on Defence Economics, the specific economic issues surrounding the relative/absolute gains debate and its impact on cooperation inside alliances and between a group of alliance member states and a third state are addressed separately. The various research contributions from Neoinstitutionalism have provided interesting insights on military alliances as an institutional framework, which is more than a forum for member states to meet and negotiate common positions. In that sense, the wrap-up

[243] The list of critical aspects in regard to the Kosovo campaign had been even longer and included, *inter alia*, certain 'special interests' of the USA in operational conduct, the share of burden-sharing, and an intensive U.S.-UK clash about the chain of command in connection with an incident at Pristina airport that involved Russian military forces. See: Weitsman, P. (2011): Wartime Alliances versus Coalition Warfare, pp. 39-47, Hyperlink: https://www.airuniversity.af.edu/Portals/10/ASPJ_French/journals_E/Volume-02_Issue-3/weitsman_e.pdf (Last visit: 01.08.2022).

[244] For a brief summary of the context of the quote of then-U.S. Secretary of Defence Donald Rumsfeld, see: Grote. I. (2007): Donald Rumsfeld's Old and New Europe and the United States' Strategy to Destabilize the European Union, pp. 347-356.

[245] Gordon, P. (2003): The Crisis in the Alliance, Hyperlink: https://www.brookings.edu/research/the-crisis-in-the-alliance/ (Last visit: 02.08.2022).

[246] Stein, A. (2008): Neoliberal Institutionalism, pp. 209 f. In: *Reus-Smit, C./Snidal, D. (eds.): The Oxford Handbook on International Relations.*

[247] Powell, R. (1991): Absolute and Relative Gains in International Relations Theory, pp. 1303-1306.

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of both, Neorealism and Neoinstitutionalism, in the interim findings at the end of this subchapter are useful to identify theoretical gaps and inform a subsequent theoretical approach to close those gaps.

2.4 Selected theories of Defence Economics

Following the introduction of two selected 'grand theories' from the IR discipline that provide a comprehensive upper boundary under which deterrence and defence issues could be analysed in broadest terms possible, it is now the time to move to a narrower set of theories taken from the 'Defence Economics' discipline as lower boundary. Before diving into these theories in detail, it might be useful to provide a basic understanding about the discipline as such. Defence Economics should be regarded as a contemporary discipline of economics, whose roots were traced backed by Hartley to the 1960 Hitch/McKean contribution 'The Economics of Defense in the Nuclear Age'. In regard to its content, the discipline provides a broad perspective on various issues pertaining to defence that encompass, *inter alia*, economic analysis of defence policy, weapons acquisition policy with a view to defence equipment cost inflation, draft versus voluntary armed forces models, and more.[248]

The diversity of the topics and subsequent theoretical approaches – covered by Defence Economics – offers an obvious challenge for the demarcation of the discipline in comparison to other theoretical approaches. As pointed out by McGuire, special attention should be given to the 'Economics' in 'Defence Economics'

> "[…] as concerned with the consequences of resource scarcity, and the necessity to allocate among alternatives […]." (McGuire)[249]

As a consequence of the assumed limitation of resources for defence-related activities that are conducted by states in the international system, a number of separate theoretical approaches with relevance to the research question can be extracted from the discipline.

As a general rule for the subchapters of 'Defence economics', the central responsibility for demand and supply of deterrence and defence rests on the nation-state and its unitary decision-making authority for defence budget, alliance and weapons acquisition policies. While generally important for the provision of defence capabilities, related issues surrounding the

[248] Hartley, K. (2020): Defence Economics, Achievements and Challenges, pp. 1-15. In: *Hartley, K. (ed.): Elements of Defence Economics*.
[249] McGuire, M. (1995): Chapter 2 – Defence Economics and International Security, p. 15. In: *Sandler, T./Hartley, K. (eds.): Handbook of Defense Economics, vol. 1.*

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power of defence firms versus the state[250], state bureaucracies and the influence of defence lobbying groups on procurements, effects from economies of scale, and cost increase through defence inflation are omitted.[251] Thus, it is to be ensured that the subchapters of the Defence Economics discipline stay focussed on the deterrence and defence posture as a political matter. For a short overview, the first subchapter of Defence Economics is dedicated to a look on defence from a public goods-theoretical perspective.[252] The second subchapter focus the question of resource allocation to defence (as an alternative to non-defence spending). The third subschapter is dedicated to a short introduction to the Economic Theory of Alliances as the apparently most relevant theory of Defence Economics. Lastly, the fourth, fifth and sixth subchapters provide an overview of the different theories regarding strategic interaction between states of a military alliance and a third state.[253]

2.4.1 Public goods theory

Before turning to the analysis of 'military security' (or its popular analogues 'defence' and 'deterrence') as a public good[254], gaining first of all a general understanding about the characteristics of public goods as opposing concept to private goods might be helpful. Spann provides an older but handy differentiation that should serve as a rough starting point for a comparison of public and private goods:

> "Private goods are commodities for which increases in one individual's consumption (holding consumption output constant) must necessarily decrease another individual's consumption by an equal amount. Public goods are provided most efficiently through some form of collective consumption whereas private goods are most efficiently supplied via the market mechanism." (Spann)[255]

The idea of public goods was first brought up by Samuelson in one of his works from the mid-1950s, wherein he identified general goods alongside a four-field matrix with the two parameters: (1) Excludability from supply of the good, and (2) Rivalry of consumption of the

[250] Former U.S President Eisenhower explicitly warned of so-called 'military-industrial complex' exercising its influence on U.S. foreign and defence policy decisions in his 1961 farewell address. If the contemporary U.S. defence industries have the level of power is at least debatable. See: Dunlap Jr., C. (2011): The Military-Industrial Complex, pp. 135-143.
[251] Hartley, K. (2020): Defence Economics, Achievements and Challenges, p. 9, p. 15, pp. 21-26, and pp. 31-38. In: *Hartley, K. (ed.): Elements of Defence Economics*.
[252] For a short overview about the relevance of public goods theory for defence, see: Hartley, K. (2020): Defence Economics, Achievements and Challenges, pp. 16-18. In: *Hartley, K. (ed.): Elements of Defence Economics*.
[253] McGuire, M. (1995): Chapter 2 – Defence Economics and International Security, pp. 15-21. In: *Sandler, T./Hartley, K. (eds.): Handbook of Defense Economics, vol. 1*.
[254] Reference are numerous studies mentioned in footnote no. 4 of: Sandler, T./Hartley, K. (2001): Economics of Alliances: The Lessons for Collective Action, p. 870.
[255] Spann, R. (1974): Collective Consumption of Private Goods, p. 63.

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good. Accordingly, a pure public good is identified when (1) non-excludability of consumers from the provision of the public good, and (2) non-rivalry in the consumption of the public good are determined. Vice versa, if both parameters offer excludability from supply and rivalry in consumption, the goods should be considered private. Mixed combinations are possible, wherein excludable and non-rival goods are considered local public goods and non-excludable and rival goods are public goods (without the 'pure' attribute).[256]

As Blümel *et al.* have shown, such rather weak features between both types of goods have been continuously discussed by various scholars, including up to the point of questioning the mere existence of a differentiation between public private goods.[257] Cowen has gone further in the same direction by formulating a thoughtful critique on the collective (also called: joint) consumption of the public good. In that sense, Cowen pointed out that the institutional setting provides the essential information, if a good should be considered private or public. Factors that shape this setting could be, *inter alia*, a higher number of consumers at a given time that create rivalry in consumption of the good or the technology used that might undermine supply of the good for specific consumers.[258] Cowen's argument in regard to the number of consumers of a public good, which in turn can create rivalry, has been further expanded by Adams and McCormick (based on Buchanan's 1965 research on club goods) by adding 'congestion' as an option to the rival – non-rival pair of the public goods theory. It is recommendable to shortly introduce the different variants or taxonomies of public goods in line with Adams and McCormick: Private goods and non-marketable public goods as extremes of the 'Exclusion-Consumption' axis as well as common property resources in terms of local public goods and marketable public goods as public goods without the 'pure' property have already been introduced at the beginning of this subchapter. The new additions are Club goods and non-marketable impurely public goods, which fill a distinctive gap on the 'exclusion-consumption' axis:[259]

> "There is a large gray area where some goods are non-rival among a few users, but become rival in the presence of a large number of users. Such goods are congestible; there is a limit to the number of persons who can share their use in a non-rival manner." (Adams/McCormick).[260]

[256] See chapters 2 and 4 in: McNutt, P. (1999): Public Goods and Club Goods. In: *Encyclopedia of Law & Economics*, Hyperlink: https://reference.findlaw.com/lawandeconomics/literature-reviews/0750-public-goods-andamp-club-goods.html (Last visit: 07.05.2022).
[257] Blümel, W./Pethig, R./von dem Hagen, O. (1986): The Theory of Public Goods: A Survey of Recent Issues, pp. 242-245.
[258] Cowen, T. (1985): Public Goods Definitions and their Institutional Context: A Critique of Public Goods Theory, pp. 55-62.
[259] Adams, R./McCormick, K. (1987): Private Goods, Club Goods, and Public Goods as a Continuum, pp. 194-198.
[260] Adams, R./McCormick, K. (1987): Private Goods, Club Goods, and Public Goods as a Continuum, p. 194.

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Wrapping up the different variants of goods, the following six-field matrix provides an overview from a public good's theoretical perspective:

		Exclusion	
		Feasible	*Non-Feasible*
Consumption	*Rival*	Private Goods	Common Property Resources
	Congestible	Club Goods	Non-Marketable Impurely Public Goods
	Non-Rival	Marketable Public Goods	Non-Marketable Public Goods

Table 4: An extended taxonomy of public goods according to Adams/McCormick[261]

The details of this rather abstract theoretical outline can be best explained by a concrete example; in this doctoral thesis' case: 'Military security'.

Amongst the archetypical examples of public goods, military security (or its analogues, like national defence, national security, etc.) is often drawn in as prominent example for a pure public good. In standardised case sample, a state is producing defence for its population that has an interest in such a public good, where individual citizens do not compete for the consumption of the public good and where nobody in the population can be excluded from the provided defence.[262] Based on Olson's and Zeckhauser's seminal work on the Economic Theory of Alliances – the theory is explained in more depth in one of the following subchapter 2.4.2 – the key interest of member states of an alliance has been identified as providing 'collective defence', which is subsequently defined as a pure (or non-marketable) public good in accordance with the public goods theory depicted in the table above.[263] In line with Hartley, this fully applies to NATO:

> "The US strategic nuclear umbrella can protect additional members of the club [i.e. NATO] without reducing the protection available to existing members (non-rivalry). And once deterrence is provided, it is available to everyone: exclusion is costly and not worthwhile (non-excludability)." (Hartley)[264]

[261] Adams, R./McCormick, K. (1987): Private Goods, Club Goods, and Public Goods as a Continuum, p. 194.
[262] Zycher, B. (n.a.): Defense. In: *Econlib Encyclopedia*, Hyperlink: https://www.econlib.org/library/Enc/Defense.html (Last visit: 07.05.2022).
[263] Olson, M./Zeckhauser, R. (1966): An Economic Theory of Alliances, pp. 266 f.
[264] Hartley, K. (2020): Defence Economics, Achievements and Challenges, p. 12. In: *Hartley, K. (ed.): Elements of Defence Economics*.

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Subsequently and with a view to the research question, 'military security' can be attributed the characteristics of a pure public good.[265] Furthermore and in full accordance to the public goods theory, Olson and Zeckhauser assumed that this collective public good is provided only sub-optimally by the alliance's member states due to the non-excludability condition. Lastly, the state's behaviour regarding the willingness to contribute to the public good of the alliance also need to take into account the value that an individual state place on the public good, i.e. states that place a higher value on 'military security' contribute relatively more than other states with a lower value of the public good.[266] The individual state's behaviour in terms of 'shouldering the burden of the public good of defence' has led to (1) Olson's and Zeckhauser's well-known 'exploitation hypothesis', i.e. some states tend to take a disproportionate defence-burden of an alliance as they normally should in view of their economic wealth, and (2) the 'free-riding' argument along which some states ('middle powers' in accordance with Zyla) contribute less to the defence-burden in comparison to the benefit received.[267] Both assumptions from Olson and Zeckhauser continue to motivate further research on this matter to contemporary times, for example Alley's probing of the exploitation hypothesis based on Bayesian modelling in a 2021 research paper, wherein he could not validate the assumption of the exploitation of relatively wealthier states in an alliance's cost distribution. Olson and Zeckhauser have therefore truly shaped the Defence economics discipline from the mid-1960s till today.[268]

The assumptions of military security as a pure public good provided were also well-reflected empirically by NATO's doctrine in the 1950s and 1960s, wherein the transatlantic alliance pursued a strategy of massive nuclear retaliation in case of a Soviet attack against any NATO member states in pursuance to Article 5 of the North Atlantic Treaty. Further research in the field of public goods in relation to free-riding in the transatlantic alliance led to the expansion of the initial Olson/Zeckhauser pure public goods model that eventually evolved into a 'joint

[265] Murdoch, J. (1995): Chapter 5 – Military Alliances: Theory and Empirics, pp. 91 f. In: *Sandler, T./Hartley, K. (eds.): Handbook of Defense Economics, vol. 1.*

[266] It should be noted that Olson and Zeckhauser apply the wording 'large states' and 'small states' in their exploitation hypothesis, which is based, *inter alia*, on defence budget as percentage of GNP. Considering the contemporary defence expenditure debate in NATO, the 2% defence investment pledge, Olson's and Zeckhauser's wording of 'large and small states' should be considered as misleading nowadays, since smaller states like the Baltic states, Poland and Croatia deliver 2% or more percent, while Germany, Italy, Turkey, France and many more fail to do so. See: Olson, M./Zeckhauser, R. (1966): An Economic Theory of Alliances, pp. 267 f., p. 270 and p. 278. And compare: NATO (2022): Defence Expenditure of NATO Countries (2014-2021), Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/2022/3/pdf/220331-def-exp-2021-en.PDF (Last visit: 19.08.2022).

[267] Murdoch, J. (1995): Chapter 5 – Military Alliances: Theory and Empirics, p. 91. In: *Sandler, T./Hartley, K. (eds.): Handbook of Defense Economics, vol. 1.* And: Zyla, B. (2016): NATO Burden Sharing: A New Research Agenda, pp. 8 f.

[268] Alley, J. (2021): Reassessing the public goods theory of alliances, pp. 1-5.

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product model' that better reflected NATO's doctrinal shift from the late 1960s onward to the 1980s towards a flexible response strategy *vis-à-vis* the Warsaw Pact and Soviet Union.[269] Numerous researchers, such as van Ypersele de Strihou, Russett, Murdoch, Sandler or McGuire took off in a new direction early on by assuming that 'military security' as a public good can have both public and private benefits. Consumption of the private benefits may therefore be obviously to fewer member states than the total number of alliance members.[270] As a result and in view of the different variations in public goods shown in the table above, Murdoch and Sandler came to the conclusion that the 'military security' provided from alliance membership is provides more than just one benefit for all its member states.

> "Thus, an alliance shares pure public (deterrence), impure public (damage-limitation forces), and private benefits." (Murdoch/Sandler)[271]

From these three variants of benefits, deterrence as a public good has already been amply addressed and the private benefits (such as the protection of a state's colonial holdings in oversees regions) are with a view to the research question ignored, the impure public benefits of military security as a public good need to receive a further look.[272] The 'blurredness' of impure public goods were already previously highlighted by Cowen's critique that he also applied to the defence domain by arguing that the limited availability of e.g. bomb shelters for civil defence purposes might warrant a rationale to provide substitute goods, such as an anti-ballistic missile system.[273] Hartley summarised the issue with impure public goods (or benefits) handily with a view to geographic conditions:

> "Conventional forces provide both deterrence and damage limiting protection and are subject to force thinning as a given amount of conventional forces are used to defend a longer border or a larger geographical area." (Hartley)[274]

It is an important take-away in regard to physical military capabilities intended as contribution to an alliance's military security (e.g. land forces, aircraft, maritime vessels), because such military forces can only be operating at a discrete time in a discrete area that is limited by the respective level of the capability's technology. Thus, 'force thinning' represents a key restricting factor of at least the conventional military alliance deterrence and defence posture,

[269] Murdoch J./Sandler T. (1982): A Theoretical and Empirical Analysis of NATO, pp. 240-242.
[270] Zyla, B. (2016): NATO Burden Sharing: A New Research Agenda, p. 9.
[271] Murdoch J./Sandler T. (1982): A Theoretical and Empirical Analysis of NATO, pp. 242.
[272] Murdoch J./Sandler T. (1991): NATO Burden Sharing and the Forces of Change: Further Observations, pp. 110-112.
[273] Cowen, T. (1985): Public Goods Definitions and their Institutional Context: A Critique of Public Goods Theory, pp. 56 f.
[274] Hartley, K. (2020): Defence Economics, Achievements and Challenges, p. 29. In: Hartley, K. (ed.): Elements of Defence Economics.

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when numbers of military capabilities contributed by member states are insufficient to cover the aggregate alliance's member state request for deployment. Conceptually, force thinning does not contain a comparative advantage between individual member state's military forces *per se*, as it works with quantitative numbers and not a qualitative measurement and needs to take into account the number of member states protected.[275] In reality, the question of 'who' deploys 'which kind of and how many forced' and 'where' should not be underestimated for individual NATO allies and the alliance as a whole.[276] From a theoretical perspective, Hirshleifer and McGuire have offered two separate models for the distribution of an alliance's pure public good based on 'best-shot' and consumption of the alliance's impure public good based on the 'weakest-link' terminology that cater for these questions, which are more thoroughly presented with a view to nuclear and conventional deterrence and defence posturing in Chapter 3.[277]

An alternative approach to aggregation of capabilities from member states of a military alliance based on the assumption of shared interests was proposed by Morrow. The basic critique that he stressed has already partially been addressed in the subchapters on IR theory in regard to the challenge of explaining the continuation of alliances despite a lack of a common threat. Subsequently, Morrow then suggested a model based on the assumption that a military alliance produces two public goods: The known one is 'security', while the other one previously not addressed in public goods theory is 'autonomy'.[278] Morrow then goes ahead and assumed that two (or more) state that cooperate could either gain the same good (symmetric relation) or one state aims at acquiring security, while the other pursued more autonomy (asymmetric relation); depending on their national preferences on a specific issue. The basic assumptions in this trade-off model are (1) if one of the two goods is kept constant, maximisation of the other is preferred by any state, (2) if a trade-off decision is necessary, states are assumed to have a convex distribution of the preferences between both goods, and (3) the combination of the two goods depends on each state's specific national preferences in regard to the issue at sake. 'Security'

[275] Murdoch J./Sandler T. (1982): A Theoretical and Empirical Analysis of NATO, p. 242.
[276] This became empirically evident by NATO's reactions to the Russian illegal annexation of Crimea. From 2014 onward, NATO and its allies launched several reassurance activities for its Eastern European allies, including, *inter alia*, a rotating NATO forward deployment of forces to the Baltics and Poland in a 'tripwire' function. See: Vershbow, A./Breedlove, P. (2019): The US and NATO Response, pp. 22-29, Hyperlink: https://atlanticcouncil.org/wp-content/uploads/2020/04/Permanent-Deterrence.pdf (Last visit: 19.08.2022).
[277] Murdoch, J. (1995): Chapter 5 – Military Alliances: Theory and Empirics, pp. 98 f. In: *Sandler, T./Hartley, K. (eds.): Handbook of Defense Economics, vol. 1.*
[278] The definition of 'security' is: "A nation's security is its ability to maintain the current resolution of the issues that it wishes to preserve." (Morrow) and the definition/description of 'autonomy' is: "Nations wish to change the status quo for some issues. These issues give rise to a nation's autonomy, the degree to which it pursues desired changes in the status quo." (Morrow). See: Morrow, J. (1991): Alliances and Asymmetry: An Alternative to the Capability Aggregation Model of Alliances, pp. 908 f.

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as a public good rest on the military capabilities that an ally provides (and the willingness of that ally to carry the cost burden), while the nature and cost of 'autonomy' depends on the conditions negotiated between alliance member states. States might want to gain 'autonomy' for the purpose of having more freedom in pursuing national political goals (e.g. for a more assertive foreign policy against non-allied third states). Other states might want to trade political 'autonomy' in order to raise 'security' (e.g., because these states face an aggressive third state with revisionist intentions). Such different national preferences play a central role for determining an alliance member state's strategy in a bargaining situation, especially since the alliance members need to unanimously agree on a course of action in regard to a third state.[279] Lastly, there are several aspects that are special to a defence market and which should be briefly mentioned. For example, the market for military security mostly has only one supplier (the national armed forces with subbranches) with neither a profit/reward orientation nor a threat of bankruptcy and take-over. And while procuring a type of military capability occurs at a market price for defence equipment, the effects of a military capability towards the supply of military security cannot be specifically be priced. Thus, the translation of input into output in order to meet the demand of national military security cannot be easily dealt with through traditional instruments like prices.[280] This makes the allocation of national resources to defence a challenging task for any state, because a number of variables have to be taken into account in the unitary national decision-making process.

2.4.2 Resource allocation theory

In the previous subchapter, military security has been classified as a public good, which offers a specific value (or benefit) for individual states that consume it in an alliance. Olson and Zeckhauser have integrated this assumption in their 1966 seminal work through a simple income-elasticity of demand model for military security for the individual ally. The conditional form equation below shows the demand for military security (MS) for a state i along an inferior-to-superior goods scale:

[279] Morrow, J. (1991): Alliances and Asymmetry: An Alternative to the Capability Aggregation Model of Alliances, pp. 910-916.
[280] Hartley, K. (2011): Defence Output Measures: An Economics perspective, pp. 3-5. Hyperlink: https://www.researchgate.net/publication/277811054_Defence_Output_Measures_An_Economics_Perspective (Last visit: 22.08.2022).

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$$If\ = \begin{cases} E_i \leq 0, & then: MS_i = \ inferior\ good\} \\ 0 < E_i < 1, & then: MS_i = inelastic\ good\} \\ 1 \leq E_i < \frac{S_i}{Y_i}, & then: MS_i = elastic\ good\} \\ E_i > \frac{S_i}{Y_i}, & then: MS_i = superior\ good\} \end{cases} \quad (1)$$

In the equation above, E_i depicts the income elasticity of defence expenditure of the state i, while S_i is the percentual change in the national defence expenditure in relation to the percentual change of individual national income Y_i. In regard to the upper boundary, Olson and Zeckhauser consider events such as an all-out war or another similar most severe security risk for a state as a rationale for states to pursue military security as a superior good.[281] The lower boundary could reflect times of peace following conflict, which might enable states to treat military security as inferior good, provided that the amount of military security previously pursued in the conflict time was acquired by a level of military capabilities considered unnecessary for the new post-conflict environment. A sample case for this state behaviour might be the usage of the so-called 'peace dividend' after the end of the Cold War.[282] The two moderate variants, i.e. military security as an elastic or inelastic public good, can be considered as covering the most common policy reactions of states.[283]

Two conclusions can be drawn from Olson's and Zeckhauser's public good input in conjunction with the public goods theory introduced in the previous subchapter: (1) Military security might conceptually be an immaterial public good, but from an economics point of view it is empirically mostly examined through quantitative data, and (2) public goods theory falls short of explaining allocation of resources by a state or a group of states towards their national military capability investments in order to acquire military security (either alone or as part of a military alliance). This subchapter makes therefore use of the first conclusion in order to give an answer to the second conclusion with a focus on a single state, while the upcoming subchapter 2.4.3 on the Economic Theory of Alliances provides more insight on acquiring military security through a military alliance.

[281] Olson, M./Zeckhauser, R. (1966): An Economic Theory of Alliances, p. 270.

[282] The states in Europe that are part of NATO and were part of the Warsaw Pact are good examples for considerable defence expenditure reductions after the end of the Cold War. However, one needs to be careful not to generalise such trends on a global scale, since states in other regions might have gone a different route and were relatively unaffected by the dissolution of the Soviet Union/Warsaw Pact. See: Chan, S. (1995): Grasping the Peace Dividend: Some Propositions on the Conversion of Swords into Plowshares, pp. 56-60.

[283] The elasticity of national demand for military security is an essential factor when analysing changes in defence expenditures of member states in alliances ('free-riding' argument). See: Sandler, T. (1993): The Economic Theory of Alliances: A Survey, pp. 451 f.

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But first of all, based on a classical two-goods model commonly used in general Economics, Douch and Solomon have provided a simple model with a view to analysing the demand for defence expenditures of middle powers. The following equation relates to a state with a central/unitary decision-making structure that aims at welfare optimisation under resource limitation:

$$W = f(C, S, Z_n)^{284} \quad (2)$$

And the linear budget constraint of the above welfare function is:

$$I = p_C C + p_m M^{285} \quad (3)$$

Alternative approaches tend to further refine the parameters of the welfare function, for example through a breakdown of the variable into individual detailed budget items, such as Paleologou's two-stage budgeting process model. In the first stage, a unitary governmental actor allocates tax and revenues to general public expenditures, amongst them: 'security'. The first stage has already been covered by Douch's and Solomon's welfare function above. However, in the second stage, Paleologou further separates 'security' in accordance with the following more detailed welfare function below:

$$S = f(M, T, C, E_1, E_2) \quad (4)$$

Herein, the 'security' expenditures separated into three subitems – 'military spending' M, 'internal security spending' T, and 'civil protection spending' C. The respective standard budget constraint is available for M, T and C, but of no further relevance in this context. Furthermore, spill-in effects on national security-related spending from adversaries E_1 and military alliance membership E_2 were added.

As an alternative approach, Hartley suggested a more refined demand function for military expenditure that focusses on military expenditures instead of Douch's and Solomon's general welfare function, but makes use of additional variables to cater for relevant politico-military conditions:

[284] The welfare function *W* consists of non-defence related consumption *C*, defence-related security *S*, and other factor Z_n, "which parameterize shifts in the welfare function, such as doctrinal changes or the politics of the party in power." (Douch/Solomon), see: Douch, M./Solomon, B. (2014): Middle Powers and the Demand for Military Expenditures, p. 610.

[285] "[…] *I* is the aggregate income often proxied by GDP, *M* and *C* are the real military expenditures and consumption, and the price for each are denoted by p_m and p_C, respectively." (Douch/Solomon), see: Douch, M./Solomon, B. (2014): Middle Powers and the Demand for Military Expenditures, p. 611.

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$$ME = f(P, Y, A, T, W, Z)^{286} \quad (5)$$

From a theoretical perspective, three aspects from both Hartley's and Paleologou's models are noteworthy: (1) National military spending is interrelated with the military spending variable of threat (predominantly of a rival state), (2) the existence of an alliance membership, such as from NATO, offers a positive spill-over effect, whereby the state might (re-)allocate its military spending to other security-related and/or non-security budgetary position, and (3) the existence of a dyadic conflict with a specific geographic neighbour of a state could still positively affect military spending.[287]

With a view to the scarcity of resources generally assumed by economic theory[288] and theory-wise given by the budget constraint of the welfare function, national investments in defence obviously compete with those in non-defence domains, such as public welfare, education, or infrastructure amongst others.[289] This particular trade-off decision by a state is known as the 'Guns versus Butter' dichotomy. The resources channelled to non-defence goods have a direct positive impact on the state's internal welfare, whereas national investment in defence provide the state defence capabilities for protecting its own resources and enable offensive operations for conquering other state's resources. The effects of the investment decision between defence and non-defence goods are consecutive, which means a multi-year underspending in defence leads to a growing defence capability gap to states that decided to invest in defence. Therefore, the 'Guns versus Butter' trade-off could be interpreted as an economic problem caused by the security dilemma of the international system that was explored in previous subchapters on the selected IR theories. States in the international system have preference for an optimal provision of non-defence goods due to positive domestic effects.[290] Investment in defence is rather some form of 'reinsurance', i.e., having national defence capabilities at hand in case that another state decides to attack.[291]

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[286] "ME is military expenditure measured in constant prices; P is the relative price of military and civil goods and services; Y is income measured by real GDP; A is a military alliance variable measured by NATO defence spending; T represents a threat variable; W is a war variable; and Z comprises all other relevant factors (e.g. political composition of government; geo-political factors such as end of the Cold War)." (Hartley). For reference, see: Hartley, K. (2020): Defence Economics, Achievements and Challenges, p. 27. In: *Hartley, K. (ed.): Elements of Defence Economics.*

[287] Paleologou, S. (2015): Modelling the demand for national security expenditure: a note, pp. 457-460 and p. 463.

[288] Porter, R. (1965): "Scarcity" in Economic Theory and Policy, pp. 22-27.

[289] Hartley, K. (2020): Defence Economics, Achievements and Challenges, pp. 14 f. In: *Hartley, K. (ed.): Elements of Defence Economics.*

[290] Powell, R. (1993): Guns, Butter, and Anarchy, pp. 116 f.

[291] Bar-El, R./Kagan, K./Tishler, A. (2010): Forward-Looking versus Shortsighted Defense Budget Allocation, pp. 638 f.

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The 'Guns versus Butter' dichotomy sparked various analytical contributions that differ considerably from this dissertation's focus on the rationale for the national decision of resource investment in military security, but are rather oriented towards other economic questions. Examples of those contributions are, *inter alia*, research on the relationship between military spending and economic growth[292], the size of defence budgets in comparison to the specific national political system[293], or individual case studies, such as an analysis of indirect effects of military spending on the non-defence public good 'education'[294]. Secondly, the question of determining national defence spending does permeate into other theoretical work strands of the Defence economics discipline, for example into arms race theory that is examined more closely in subchapter 2.4.4.[295] From those various arms theory-related contributions in conjunction with resource allocation, Ersel offered a simple demand model for national military security that provides the theoretical rationale of a state increasing its national defence expenditures as result of an external threat:

$$Z^d(\Upsilon, L) = \xi L^v \tag{6}$$

Thus, the demand of a state for military security from its population L (the sum of a civilian population L_p and military personnel L_g) and the perceived threat Υ is a function of a fixed threat level ξ and the population sensitive elasticity of the defence public good L^v with the condition $v < 1$. The supply of military security is based on a Leontief fixed coefficient production function:

$$Z^s = \min(\theta G_m, \beta L_g) \tag{7}$$

The term G_m denotes expenditures for defence capabilities with θ as physical input coefficient and the term L_g the defence expenditure (wage rate) for military personnel with β as labour coefficient. Comparing a state's demand with supply of military security, the following possibilities ensue (MS = member state of an alliance):

$$If = \begin{cases} Z^d = Z^s, \ then: MS\ fully\ supplied\ nationally\} \\ Z^d < Z^s, \ then: excessive\ supply\ of\ MS\} \\ Z^d > Z^s, \ then: insufficient\ supply\ of\ MS\} \end{cases} \tag{8}$$

In regard to the research question, joining a military alliance is therefore a reasonable decision for a state that has insufficient resources to meet its own required level of national military

[292] See: Alexander, W. R. (2015): The Keynesian IS-MR Model and Military Spending, pp. 213-216; And: Dunne, J. P./Smith, R./Willenbockel, D. (2005): Models of Military Expenditure and Growth: A Critical Review, pp. 449-461.
[293] Brauner, J. (2014): Military spending and democracy, pp. 409-411.
[294] Mintz, A./Huang, C. (1991): Guns versus Butter: The Indirect Link, pp. 738-757.
[295] See: Shabtay. H./Tishler, A. (2014): Budget allocation under uncertainty and the costs of war and insecurity, pp. 465-469; And: Andreou, A./Parsopoulos, K./Vrahatis, M./Zombanakis, G. (2002): Optimal versus required Defence Expenditure: The Case of the Greek-Turkish Arms Race, pp. 331-333.

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security. Analytically, it is a good indicator for measuring the need for military security in individual astates. If demand for military security meets the supply, there is no added value for a state to join an alliance. If supply surpasses the demand for military security, a national reaction could be to reduce defence spending. This is another option how to evaluate the already mentioned 'peace dividend'.[296]

Considering the different previously introduced research contributions and other potentially relevant theoretical models for national resource allocations to defence, such as Bar-El *et al.* short-term versus long-term defence budget planning model[297] or Powell's resource investment model for explaining offence-defence state behaviour[298], require a more or less symmetric rival state. Thus, transferring the models into a post-Cold War geopolitical environment with the absence of a singular unifying threat, such as the Soviet Union/Warsaw Pact was, represents somewhat of a challenge. Skogstad's 2015 research on spatial econometrics models for the post-Cold War era are helpful in this regard, because it relaxes the 'threat' condition for the national determination of defence expenditures. In that sense, the starting point of Skogstad's model is the spatial autoregressive equation:

$$y_{it} = \rho \sum_{j=1}^{N} W_{ij} y_{it} + X_{it}\beta + \mu_i + \epsilon_{it}{}^{299} \qquad (9)$$

Instead of designating a rival state, Skogstad's model computes the relevance of other state's defence expenditures on state i along five weighting matrices. While the first and second matrices reflect fixed geographic conditions, such as the distance between states and the sharing of a common border, the third, fourth, and fifth matrices are derived from a classification of states in type P (middle, regional, and superpowers) and type Q (other states) based on the individual military capabilities. These reflect the combination of interrelations between types P/P, P/Q, Q/P, and Q/Q. Regardless of the econometric and theoretical challenges of Skogstad's approach, the usage of physical military capabilities in order to determine the status of a state

[296] Ersel, H. (2004): Optimal growth under military threat, pp. 133-138.

[297] Bar-El, R./Kagan, K./Tishler, A. (2010): Forward-Looking versus Shortsighted Defense Budget Allocation, pp. 640-648.

[298] Powell, R. (1993): Guns, Butter, and Anarchy, pp. 121-127.

[299] y_{it} is the defence budget (dependent variable) of state i as percentage of defence expenditures per GDP at a given time t; ρ is a single value, indicating the relationship of spatial factors towards state i's defence expenditure (assumed to be positively correlated); the sum-symbol covers the comparison between state i and another state j for a total number of N states; W_{ij} represents a matrix of relative weight of exogenous factors for state i (e.g. $W_{ij} = 0 \rightarrow no\ impact\ on\ state\ i's\ defence\ budget,$ and $W_{ij} > variable\ impact\ on\ state\ i's\ defence\ budeget$); y_{it} is the defence spending of state j at a given time t; X_{it} is a matrix of independent variables for state i at a given time t; β is the coefficient for X_{it}; μ_i is a spatial fixed term; and ϵ_{it} is the error term for state i at a given time t. See: Skogstad, K. (2015): Defence Budgets in the Post-Cold War Era: A Spatial Econometrics Approach, pp. 6-8, Hyperlink: https://mpra.ub.uni-muenchen.de/61465/1/MPRA_paper_61465.pdf (Last visit: 10.06.2022).

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in type P or type Q is particularly noteworthy, because so far, the resource allocation theories presented above have been largely limited to defence expenditures. Therefore, Skogstad gives interesting input, how to include military capabilities via quantitative data to economic research.[300] Another alternative approach for determining national resource investments through the integration of physical defence capabilities and military personnel into a model had been the so-called the 'military production function':

$$Q = f(A, K, L)^{301} \tag{10}$$

The function contains a logical input-output relationship between allocated resources and a defence output. As Hartley notes, such an apparently simple function has a number of econometric issues that makes it difficult for applied research. Problems cause e.g. the correct identification and evaluation of different variables with a view to identifying the optimal amount of desired defence output.[302] Studies performed on defence input-output have also mostly focussed on cost-effectiveness analysis.[303] For this dissertation, such an analysis for deterrence and defence does not make much sense and is not further pursued in that direction, because, looking at the time period 1992-2016, NATO's deterrence and defence posture had been sufficient to prevent any symmetrical all-out war between the transatlantic alliance and a third state.[304] This does mean that NATO states were not active participants in conflicts in the time period[305]. Nevertheless, the military production function proves the validity of physical military capabilities and military personnel as variables and its addition to the classical indicator of national defence expenditures, when evaluating military security.

[300] Skogstad, K. (2015): Defence Budgets in the Post-Cold War Era: A Spatial Econometrics Approach, pp. 8-13, Hyperlink: https://mpra.ub.uni-muenchen.de/61465/1/MPRA_paper_61465.pdf (Last visit: 10.06.2022).
[301] "[…] Q is defence output and A, K and L are inputs with A representing technology, K capital and L labour." (Hartley), see: Hartley, K. (2020): Defence Economics, Achievements and Challenges, p. 18. In: *Hartley, K. (ed.): Elements of Defence Economics.*
[302] Hartley, K. (2011): Defence Output Measures: An Economics perspective, pp. 7-9. Hyperlink: https://www.researchgate.net/publication/277811054_Defence_Output_Measures_An_Economics_Perspective (Last visit: 22.08.2022).
[303] Hartley, K. (2020): Defence Economics, Achievements and Challenges, pp. 20 f. In: *Hartley, K. (ed.): Elements of Defence Economics.*
[304] It is a philosophical debate, whether NATO's capabilities had been sufficient to deter a third state's attack or if it was merely a coincidence that potential rival third states did not have the capabilities or willingness to challenge NATO at the time.
[305] One of the key conflicts between 1992-2016 and especially after 11. September 2001 had been between Western countries and terrorist groups. For some further input on the application of deterrence on terrorism, see: Trager, R./Zagorcheva, D. (2006): Deterring Terrorism: It Can Be Done, pp. 89-111. And: Arce M., D./Sandler, T. (2005): Counterterrorism: A Game-Theoretic Analysis, pp. 185-198.

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2.4.3 Economic Theory of Alliances

This subchapter is dedicated to a short introduction to the Economic Theory of Alliances on the basis of Olson's and Zeckhauser's 1966 seminal work with the identical title – an essential contribution to the evolution of the Defence Economics discipline. Since this PhD thesis focusses on deterrence and defence of a military alliance, making a stop for a short review of Olson's and Zeckhauser's theory appears a logical undertaking. But despite the fact that the Economic Theory of Alliances offers some interesting insight in elements of collective deterrence and defence issues particularly of NATO, it is shown in this subchapter that it fails short to empirically answer the research question.[306] Before expressing this critique further, the first step is a short review of the origins of the Economic Theory of Alliances.

With the end World War 2, an era of the unprecedented rise of international institutions as systems of multinational cooperation, including system-building of collective security, was set in motion. International institutions (or organisations) were not unknown previous to 1945, but were not able to perform their task adequately, namely preventing inter-state conflict.[307] The U.S. evolved not only as one of the victors, but also as important pole of the new post-World War 2 world order; eager to promote its liberal and democratic system through a set of political and economic international institutions.[308] The other major victor, the Soviet Union, had been in a similar position, while more weakened by their losses in people and material in the previous war.[309] While the year 1945 has been historically connected to the end of World War 2, it also marked the early stage of the ensuing Cold War between the U.S and the Soviet Union, which is not laid out in more detail at this point.[310] The growing tensions between both the U.S. and the Soviet Union, manifesting in the scope of multiple events such as the communist coup in Czechoslovakia, the first Berlin blockade or the increasing spread of influence of communist groups in non-socialist states, became the catalyst for the foundation of NATO.[311] There were obviously further considerations of the Western partners, why such a military alliance was required at the time, – the famous quote from NATO's first Secretary General Lord Ismay was

[306] Hartley, K. (2020): Defence Economics, Achievements and Challenges, p. 12. In: *Hartley, K. (ed.): Elements of Defence Economics.*
[307] Ebegbulem, J. (2011): The Failure of Collective Security in the Post World Wars I and II International System, p. 26.
[308] Ikenberry, G. J. (2005): Power and liberal order: America's postwar world order in transition, pp. 137-141.
[309] For a more detailed account of the Soviet infrastructure damage from war and the subsequent reconstruction efforts, see: Dale, R. (2015): Divided we Stand: Cities, Social Unity and Post-War Reconstruction in Soviet Russia, 1945-1953, pp. 493-516.
[310] For further interesting historical input on the origins of the Cold War with a focus on a 'national security' perspective, see: Jones, H./Woods, R. (1993): Origins of the Cold War in Europe and the Near East: Recent Historiography and the National Security Imperative, pp. 251-276.
[311] Haar, R. (2019): What does NATO do for America?, pp. 15-16.

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already brought up on page 53 in this dissertation[312] – but the transatlantic alliance evolved to a cornerstone of the U.S foreign, security and defence policy *vis-à-vis* the Soviet Union in Europe:

> "With West Germany joining (bringing membership to 15), the alliance became cornerstone of the United States' containment strategy in Europe during the Cold War" (Haar)[313]

Against this backdrop, it became clear that considerable investments were required by the U.S. government for ensuring that military capabilities in Europe as well as in general (e.g. nuclear strategic deterrence) were sustained. Meanwhile, the European members of NATO were criticised early on for failing to 'do their part' by retaining adequate numbers of military forces for a potential Soviet attack on NATO. Some critics had voiced the usefulness of the alliance altogether, even as far as questioning if it would not be advisable using NATO as a "bargaining counter" (Warburg) for political trade-off with the Soviet Union to gain some sort of neutral zone in central Europe.[314]

Rather than an ad-hoc reaction to such controversial debates, Olson's scientific interest in group dynamics became evident through another important research work on 'The logic of collective action' published in the previous year (1965). In this work, Olson argued on the basis of public goods' assumptions (i.e. non-rivalry and non-excludability in regard to consumption) that each individual pursues its own interest without considering the common interest in regard to the public good and that the group size has a considerable influence on the individual's tendency to choose a free-riding strategy for the public good (i.e. consuming without contributing).[315] Furthermore to the individual behaviour, Olson's work also recognised a specific behavioural pattern in a group with a view to the later Economic Theory of Alliances:

> "Those who would benefit most from a public good and have the greatest means to provide it will bear a disproportionate share of the costs, while "smaller" members of the group will bear a burden that is less than their share of benefits and resources." (Oneal)[316]

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[312] NATO (n.a.): Origins – NATO Leaders, Hyperlink: https://www.nato.int/cps/en/natohq/declassified_137930.htm (Last visit: 21.07.2022).
[313] Haar, R. (2019): What does NATO do for America?, p. 16
[314] For an exemplary outspoken critique of early NATO, see: Warburg, J. (1960): How Useful Is NATO?, pp. 136-141. On a consecutive side-note, Olson and Zeckhauser did not intend to make a moral case of their economic theory of alliances for the U.S to demand more contributions from the smaller NATO member states. Rather, both researchers argued to make institutional changes in NATO by incentivizing more proportionate spending, thus improving the outcome of every NATO ally. See conclusions and footnote no. 32: Olson, M./Zeckhauser, R. (1966): An Economic Theory of Alliances, pp. 278 f.
[315] Oneal, J. (1990): The Theory of Collective Action and Burden Sharing in NATO, pp. 379-383.
[316] Oneal, J. (1990): The Theory of Collective Action and Burden Sharing in NATO, pp. 380.

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For testing this argument on international organisations, Olson and Zeckhauser took a number of generalised observations made by other researchers of the academic community at the time on which they then based their seminal work. Those general observations with a view to NATO were: (1) Some larger NATO member states spend more on defence than smaller NATO members that therefore leads to the argument of a disproportionate burden-sharing inside the alliance, and (2) NATO member states failed to provide the number of divisions (i.e. the military force formations) required by NATO defence planning. In addition, and often forgotten[317], Olson and Zeckhauser also included the failure of states to comply with their national contribution quotas to the UN, which was assumed to lead to an imbalance towards the U.S.[318]

Before constructing their theoretical model, the researchers made a number of assumptions that set the boundaries for their economic theory based on the premises of public goods:

> "[…]
> (i) allies share a single purely public defense output,
> (ii) a unitary actor decides defense spending in each ally,
> (iii) defense costs per unit are identical in each ally [i.e. no comparative advantage],
> (iv) all decisions are made simultaneously, and
> (v) allied defense efforts are perfectly substitutable." (Sandler/Hartley)[319]

Based on these assumptions, a representative general utility function for a state i, who is member of a military alliance was modelled. Since the original article of Olson and Zeckhauser did not contain any formalised econometric model, the subsequent equations are based on Hartley's and Sandler's summary.[320] It applies:

$$U_i = f(y_i, q_i + Q_{-i}, T)^{321} \tag{11}$$

Under the linear budget constraint

$$I_i = y_i + pq_i^{322} \tag{12}$$

---

[317] Later research particularly acknowledged Olson's and Zeckhauser's contribution to an analysis of NATO, whereas both researchers took NATO just as a sample case for a theory applicable to any international organisation, compare: Oneal, J. (1990): The Theory of Collective Action and Burden Sharing in NATO, p. 379 and p. 381; with: Olson, M./Zeckhauser, R. (1966): An Economic Theory of Alliances, p. 266 and pp. 278 f.
[318] Olson, M./Zeckhauser, R. (1966): An Economic Theory of Alliances, p. 266.
[319] Sandler, T./Hartley, K. (2001): Economics of Alliances: The Lessons for Collective Action, pp. 871.
[320] Compare: Sandler, T./Hartley, K. (2001): Economics of Alliances: The Lessons for Collective Action, pp. 872-875; With: Olson, M./Zeckhauser, R. (1966): An Economic Theory of Alliances, pp. 268-271.
[321] The utility function U_i of a state i encompasses a private non-defence numeraire good y_i, the sum of the public good for defence q_i of state state i plus the public defence goods of the allied states Q_{-i}, and a threat T that another third state poses (quantified through T's defence expenditure). See: Sandler, T./Hartley, K. (2001): Economics of Alliances: The Lessons for Collective Action, pp. 872 f.
[322] In the budget constraint, the I_i represents total GDP of a state i, which consists of the sum of the private non-defence good y_i (here assumed with a price coefficient 1), and the public defence good q_i, with the price coefficient p (that is equal across all states from the country sample; no comparative advantage). See: Sandler, T./Hartley, K. (2001): Economics of Alliances: The Lessons for Collective Action, p. 873.

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Then, Olson and Zeckhauser translated their empirical observation into five hypotheses for international organisations in order to test these. From this five hypothesis, one addressed defence in general and two were focussed on NATO that are hereby presented: (1) a significant positive correlation between a NATO member state's GDP[323] and its defence spending as percentage of GDP, (2) a significant positive correlation between NATO member state's GDP and NATO's activities, for which costs are not shared amongst NATO allies, and (3) a significant negative correlation of a NATO member state's GDP and the percentage of GDP committed for NATO infrastructure.[324] In order to avoid any confusion, it should be noted that a membership of NATO 'does not come for free' – even for free-riding state –, because the organisation has a military and civilian' common budget that every member state needs to contribute negotiated financial shares to. 'NATO common costs' paid from these budgets entail, *inter alia*, the NATO integrated military command structure, the civilian headquarters costs including international staff salaries, or certain infrastructure activities that benefit NATO's deterrence and defence posture. The absolute financial volumes of those 'NATO budgets' (around 1% of total defence expenditures of NATO's allies in 1999) are negligible nowadays, but Olson's and Zeckhauser's concerns were focussed on the distributional balance of the NATO common costs amongst larger and smaller member states.[325]

It should not come to a surprise that Olson and Zeckhauser tested and eventually validated their model and the collective results of their theory became known as the 'exploitation' hypothesis, wherein larger NATO member states carried a disproportionate share of the collective defence-burden while smaller NATO allies were free-riding.[326]

As already extensively shown in subchapter 2.4.1 on public goods theory, Olson's and Zeckhauser's approach has been based on a pure public goods model, whereas later researchers tended to apply a broader so-called 'joint products model' that attributes three 'degrees of purity in the collective goods' (Zyla) provided by an alliance for its member states. Those degrees encompass (1) public, (2) impure public, and (3) private goods.[327]

[323] Olson and Zeckhauser used the Gross National Product as basic economic parameter of a state's income, whereas later researchers shifted towards GDP, compare: Olson, M./Zeckhauser, R. (1966): An Economic Theory of Alliances, p. 276 and pp. 274 f.; with: Oneal, J. (1990): The Theory of Collective Action and Burden Sharing in NATO, pp. 381.

[324] Olson, M./Zeckhauser, R. (1966): An Economic Theory of Alliances, pp. 274-277.

[325] Hartley, K./Sandler, T. (1999): NATO Burden-Sharing: Past and Future, pp. 668 f.; and: Olson, M./Zeckhauser, R. (1966): An Economic Theory of Alliances, pp. 278 f.

[326] Ihori, T./McGuire, M./Nakagawa, S. (2014): International Security, Multiple Public Good Provisions, and The Exploitation Hypothesis, pp. 214 f.

[327] Zyla, B. (2016): NATO Burden Sharing: A New Research Agenda, pp. 8-9.

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Murdoch and Sandler proposed three consecutive models in order to cater for this distinction in the provision of different types of public goods inside military alliances. The base model covers the public and private good provision of an alliance following utility function for a state i:

$$U_i = f(y_i, r_i, z_1 + z_2)^{328} \quad (13)$$

Under the linear budget constraint:

$$I_i = \alpha y_i + \beta q_i^{329} \quad (14)$$

The researchers then move further and extend this model twice. The first extension tackles the effects of force thinning – or 'damage-limitation jointly produced benefits' (Murdoch/Sandler) – under the condition of monotonous member states (i.e. all allies are treated equally, thus there is no distinction between state i and state j). While the previous function had one private good and one pure public good, the following welfare function caters for the congestion of the provided forces between the individual member states of an alliance. It applies:

$$U = f(y, x, N, Nz + \bar{z})^{330} \quad (15)$$

The budget constraint shows likewise the effect of force thinning dependent on the number of allies N that share an alliance's damage-limiting weapons.

$$I = \alpha y + \frac{\beta q}{N}^{331} \quad (16)$$

In a second and final extension, Murdoch and Sandler change the allies to heterogenous member states that congest an unequal part of the overall damage-limiting weaponry of an alliance. If one ally i consumes its nationally determined demand of the shared weaponry x of an alliance remaining $x - x_i$ with the condition that x_i might differ from x_j of another ally j, but total consumption of damage-limited weaponry is limited to $\sum_{i=1}^{N} x_N \leq 1$. The utility function now reads:

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[328] The utility function U_i of a state i encompasses the private numeraire non-defence good y_i, the private defence good r_i, deterrence public good $z_1$and spill-ins/spill-overs from other allies z_2. See: Murdoch J./Sandler T. (1982): A Theoretical and Empirical Analysis of NATO, p. 244.

[329] The linear production transformation frontier, which consists of the sum of the private non-defence good y_i with a price coefficient α and the defence good q_i with a price coefficient β. Important note: q_i entails fixed proportions of r_i and z_i. See: Murdoch J./Sandler T. (1982): A Theoretical and Empirical Analysis of NATO, p. 245.

[330] The welfare function U consists of the private non-defence good y, the volume of jointly produced damage-limiting weapons x that underlies force thinning, a specified number of monotonous alliance member states N, while Nz is the public deterrence effect of the shared use of damage-limiting weapons x, plus the added value of $\bar{z}$, which reflect deterrence spill-ins e.g. through a strategic nuclear weapons arsenal of an ally. Important note: Increase in x and Nz also increase welfare and N decreases welfare due to force thinning effects on x. See: Murdoch J./Sandler T. (1982): A Theoretical and Empirical Analysis of NATO, pp. 249-252.

[331] The generalised linear production transformation frontier which consists of the sum of the private non-defence good y with a price coefficient α and the defence good q with a price coefficient β divided by the number of the allies N that congest public deterrence of the alliance. See: Murdoch J./Sandler T. (1982): A Theoretical and Empirical Analysis of NATO, p. 250.

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$$U_i = f(y_i, r_i, t(k), Nz)^{332} \quad (17)$$

Lastly, Murdoch and Sandler also provide a fully integrated model, which include the provisions of the three increasingly extended models presented above, but at this point, it is suffice to understand the evolutionary steps of moving from a pure public good to the joint products model that takes into account numbers of allies, a heterogenous provision and congestion of common deterrence, and the level of commitment shown by allies through the relationship between defence expenditures routed to private benefits versus shared benefits of a military alliance.[333]

Following increasing work on the Economic Theory of Alliances performed by various researchers that was briefly shown in this subchapter, it becomes obvious that it has had a considerable impact on the Defence Economics discipline and subsequently tempted researchers to regularly review the 'exploitation hypothesis' in conjunction with the distribution of NATO's defence-burden amongst its member states.[334] As a more recent example (2014), Sandler and Shimizu have reviewed the Economic Theory of Alliances with updated data sets and new variables that reflected the geopolitical changes (e.g. war on terror, crisis management operations, NATO enlargement) since the 2000s. Both researchers come, *inter alia*, to the conclusion that the exploitation hypothesis cannot be rejected from the mid-2000s onward and that this would be the first time since 1975 according to their calculations.[335] In an even newer contribution (2021), Alley applied Bayesian economics to the question of free-riding in NATO and concluded that the exploitation hypothesis in terms of free-riding based on the economic weight of NATO member states could not be confirmed.[336] There are few research contributions that move beyond burden-sharing outside of NATO.[337] One particular example is a paper from Dorussen *et al.* that elevate the theoretical background of a joint products model of extended burden-sharing analysis to the more complex governance structure of the EU.[338] Since the question of the distribution of the defence burden among alliance member states is not part of

[332] The utility function U_i of a state i encompasses the private numeraire non-defence good y_i, the private defence good r_i, while Nz is the public deterrence effect of the shared use of damage-limiting weapons. The new addition is $t(k)$, which is the force thinning of the average damage-limiting weaponry. It applies $t(k) = \sum_{i=1}^{N} x_i / x_{quantity}$. See: Murdoch J./Sandler T. (1982): A Theoretical and Empirical Analysis of NATO, pp. 252 f.

[333] Murdoch J./Sandler T. (1982): A Theoretical and Empirical Analysis of NATO, p. 244.

[334] For a tabular overview of a selection of research contributions from 1966-1996 with their respective test methods for measuring burden-sharing, see: Sandler, T./ Murdoch, J. (2000): On Sharing NATO Defence Burdens in the 1990s and Beyond, p. 309.

[335] Sandler, T./Shimizu, H. (2014): NATO Burden Sharing 1999-2010: An Altered Alliance, pp. 47-59.

[336] Alley, J. (2021): Reassessing the public goods theory of alliances, pp. 3-5.

[337] Sandler, T. (1993): The Economic Theory of Alliances: A Survey, pp. 476-479.

[338] Dorussen, H./Kirchner, E./Sperling, J. (2009): Sharing the Burden of Collective Security in the European Union, pp. 789-809.

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this dissertation, therefore a discussion of the design of econometric models and evaluation of empirical data for further reviewing the Economic Theory of Alliances can be omitted.

As indicated in the beginning of this subchapter, the Economic Theory of Alliances has considerable limitations in view of the research question. The research contribution from central proponents in the field – not only Olson and Zeckhauser[339], but also Sandler and Hartley – are predominantly focussed on defence expenditures as a measurement for the defence burden of an alliance. On a positive note, Sandler and Hartley used physical capabilities in their empirical analysis, such as strategic deterrence from land-based as well as submarine-launched nuclear long-range missiles and nuclear-armed bombers and force thinning based on the ratio of military personnel numbers to exposed borders to non-allied states plus coastline.[340] Nevertheless, the predominant use of military expenditures[341] as the central dependent variable in the empirical analyses of this theoretical field distorts the meaningfulness of the distribution-focussed Economic Theory of Alliances for this doctoral thesis. The most important issue of military alliances in general and NATO in particular is to have sufficient military capabilities at a given time in place to deter any attack by a third state based on the case that deterrence fails and defence is required. These are challenges that a fair distribution of the defence-burden of a military alliance in terms of national defence expenditures percentage per GDP cannot adequately answer.[342]

2.4.4 Arms Race theory

Similar to the previously introduced the Economic Theory of Alliances derived from Olson's and Zeckhauser's work, the contemporary academic literature on arms races was heavily influenced by a singular research contribution as well. This had been Richardson's 1960 seminal work on 'Arms and Insecurity' that inspired academics to apply and adapt his arms race model till today.[343] Before going into more detail on Richardson's model, it might be useful

[339] Olson, M./Zeckhauser, R. (1966): An Economic Theory of Alliances, pp. 268.
[340] Murdoch J./Sandler T. (1982): A Theoretical and Empirical Analysis of NATO, pp. 255 f.
[341] Compare: The tabular overview in: Sandler, T./ Murdoch, J. (2000): On Sharing NATO Defence Burdens in the 1990s and Beyond, p. 309; A previous survey in: Sandler, T. (1993): The Economic Theory of Alliances: A Survey, pp. 476-479; Or: Sandler, T./Shimizu, H. (2014): NATO Burden Sharing 1999-2010: An Altered Alliance, pp. 45-47.
[342] Cordesman, A. (2021): The Biden Transition and Reshaping U.S. Strategy: Replacing "Burden Sharing" with Meaningful Force Planning, pp. 16-21, Hyperlink: https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/210111_Cordesman_Burden_Sharing.pdf (Last visit: 23.08.2022).
[343] Hartley, K. (2020): Defence Economics, Achievements and Challenges, pp. 27 f. In: Hartley, K. (ed.): Elements of Defence Economics; Caspary, W. (1967): Richardson's Model of Arms Races: Description, Critique, and an Alternative Model, pp. 63-72; and the subchapter on "What drives arms races? In: Stoll, R. (2017): To Arms, To Arms: What Do We Know About Arms Races?, Hyperlink: https://oxfordre.com/politics/view/10.1093/acrefore/9780190228637.001.0001/acrefore-9780190228637-e-350 (Last visit: 16.02.2022).

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to explain briefly, why arms race theory should be at least partially relevant to the research question. After the end of the Cold War and the dissolution one of the two competing politico-military poles, interest in arms race theory has obviously waned, because the core of arms races was and is predominantly the scenario of two states ever increasing their military expenditures in reaction to each other in order to retain the desired level of military security. Despite that this might have no direct relevance for the post-Cold War era due to the main threat's dissolution, this particular theory from Defence Economics should still be shortly reviewed with a view to identifying valuable insights into the nature of arms races, which may remain valid for and adaptable to the post-Cold War era.[344]

As a starting point, an arms race constitutes

> "[…] the competitive, resource constrained, dynamic process of interaction between two states or coalitions of states in their acquisition of weapons." (Intriligator/Brito).[345]

This definition provides a handy and self-explanatory description on the nature of arms races, namely a dynamic interaction between a dyad of states through the increase in numbers of military capabilities limited by resource constraint. However, the definition gives no insight into the reasoning for states to conduct arms races. The rational justification for explaining arms races can traced back to game theory and the particular setting of the 'prisoner's dilemma'. In the normal form game of a 'prisoner's dilemma, as depicted below, two states i and j can choose from two strategies, i.e. if either one spends their scarce financial resources on the military for the benefit or if they decide to spend it on something else, e.g. non-defence related public goods:

		State j	
		Military spending	*No military spending*
State i	*Military spending*	-5, -5	10, -10
	No military spending	-10, 10	5, 5

Table 5: Classical normal form game of the "prisoner's dilemma" according to Snyder[346]

The pareto-optimal choice for both states is 'no military spending', because this option would enable both states to invest their financial resources in other non-defence related domains (such as education, healthcare, etc.). However, both states do not have any information about the choice that the respective other state makes. Subsequently, both states cannot be sure that the

[344] See the subchapters "The End of the Cold War and the Decline of the Study of Arms Races" and "The Future of Arms Race Studies" in: Stoll, R. (2017): To Arms, To Arms: What Do We Know About Arms Races?, Hyperlink: https://oxfordre.com/politics/view/10.1093/acrefore/9780190228637.001.0001/acrefore-9780190228637-e-350 (Last visit: 16.02.2022).
[345] Intriligator, M./ Brito, D. (2000): Arms Races, p. 46.
[346] Snyder, G. (1971): "Prisoner's Dilemma" and "Chicken" Models in International Politics, p. 67.

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other state opts for 'military spending' that enables the other state to pursue a more aggressive foreign policy. It cannot be ruled out by state j that the 'military spending' choice of State i does not represents to a military threat for state j. Subsequently, state j could feel inclined to react by choosing the 'Military spending' strategy as well. If state i reacts to States j by even further increasing its military spending, an arms race would ensue as the logical consequence and at the same time the Nash-equilibrium[347].[348]

There are more complex arms race models available, which further explore the rationale by which states decide to initiate and maintain arms races, but those tend to apply two general assumption that should be noted before going into further models. The assumptions are (1) a complexity reduction by limiting the theoretically assumed interaction to two states or power blocs and (2) the homogenisation of the arms acquisition into one generalised 'weapon'.[349]

The logical explanation for such an approach is straightforward: A dyad of two states or coalitions is easier to display in a normal or extended form decision tree and together with the generalisation of arms in a singular 'weapon' (or any analogue such as number of missiles or amount of military spending), the translation of those and other 'simple to quantify' variables into an equation is enabled.

One of the most influential and more detailed approaches in arms race theory is offered by Richardson's 'Linear Theory of two Nations', which proposes a dynamic interaction of two states in an arms race. Richardson's model is based on three assumptions: (1) Based on the fair of reduction in military security posed by the military expenditures of a state Y, state X increases its military expenditures proportionately, followed by a likewise reaction by state Y in response to state X increased military expenditures, (2) the pressure on the state X,Y to limit defence expenditures grows proportionately together with their own actual increase the military expenditures, and (3) a behavioural factor, such as the national level of ambition or existence of inter-state feuds, further increase efforts in military capabilities. Richardson estimated such a behavioural factor at a constant rate and exists in addition to any threat of another state's military expenditures.[350]

For a better visualisation of Richardson's 'Linear Theory of two Nations', the two core equations are depicted below:

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[347] A Nash-Equilibrium is defined as "[a]strategy pair is a Nash equilibrium if no player could achieve a better outcome by switching, unilaterally, to another strategy." See footnote no. 14 in: Zagare, F. (2004): Reconciling rationality with deterrence. A re-examination of the logical foundations of deterrence theory, p. 112.
[348] Snyder, G. (1971): "Prisoner's Dilemma" and "Chicken" Models in International Politics, pp. 67-73.
[349] Intriligator, M./Brito, D. (1976): Formal Models of Arms Races, pp. 77 f.
[350] Caspary, W. (1967): Richardson's Model of Arms Races: Description, Critique, and an Alternative Model, p. 64.

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$$\delta X = a_o - a_1 X + a_2 Y \quad (18)$$

$$\delta Y = b_o - b_1 Y + b_2 X^{351} \quad (19)$$

Richardson's model provided a straightforward and simple approach for researchers interested in exploring arms races, despite comprehensive methodological critique, both in terms of mathematics and theory.[352]

To somewhat cater for the theoretical critique of Richardson's model, particularly in regard to the cause of arms races, the Stock Adjustment model offers an alternative approach under the following theoretical outline: State X increases its number of military capabilities, which is set by the difference between a nationally 'desired' level of military capabilities X^* versus its existing military capabilities X. The coefficient a_1 represents rate of increase towards the desired defence spending level. For state Y the above outline is shifted to Y^* and Y respectively. Such a model would partially solve 'hen and egg' problem of arms races, because the set-off would then be triggered not by another state, but by the own national 'desired' level of military capabilities (even if the model does not explain, what determines the 'desired' level comes from). The initial equations of the Stock Adjustment model are:

$$\delta X = a_1(X^* - X) \quad (20)$$

$$\delta Y = a_1(Y^* - Y) \quad (21)$$

Under the assumption that the level of desired number of military capabilities of state X relates to the existing military capabilities of state Y, and vice versa, the arms race model be represented by the following two linear functions:

$$\delta X = a_1[(\alpha_2 + \alpha_3 Y) - X\,] \quad (22)$$

$$\delta Y = a_1[(\alpha_2 + \alpha_3 X) - Y)] \quad (23)$$

In this extended model, α_2 is the base increase that a state X wants to achieve regardless of the other state, while α_3 is the coefficient of the competing state's military spending to be included in the own desired military spending level. The difference to Richardson's model lies in the openness of the resulting arms race, as the reaction curves due to the different coefficients of both states can lead to different outcomes due to strategic considerations and constraints.[353]

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[351] δX and δY "[…] are the changes in military spending over time of the two nations, X and Y; a_o and b_o are grievance terms for each nation. Grievance could be the desire for revenge for past wrongs and defeats (e.g. Germany after the Second World War); a_1, b_1 are fatigue factors reflecting the economic burdens of military spending (e.g. guns versus butter) and their negative signs show that higher military spending involves greater economic burdens reflected in greater sacrifices of civil goods; a_2, b_2 are reaction coefficients showing the arms race effect where each nation responds to the defence spending of its rival." (Hartley). For reference, see: Hartley, K. (2020): Defence Economics, Achievements and Challenges, pp. 27 f. In: *Hartley, K. (ed.): Elements of Defence Economics*.

[352] More details on the critique can be found in: Anderton, C. (1989): Arms Race Modeling: Problems and Prospects, pp. 348-357.

[353] Intriligator, M./Brito, D. (1976): Formal Models of Arms Races, pp. 79 f.

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Nevertheless, the main question posed to such arms race models still remains: Do states initiate an arms race because of internal motives or are they triggered to do so by external factors? – There are arguments for both options[354], but since this doctoral thesis treats states as unitary actors, the domestic nuances are generally omitted. In line with Glaser's survey, there are two possible motives of unitary states for conducting arming and subsequent an arms race, if the other state in the dyad reacts accordingly: (1) The pursuance of military security, as assumed to be the motive of NATO's member states in their policy strategy choices, and (2) greediness in order to gain concessions through coercion of another state or by preparing for a military conflict in order to take concessions by force (e.g. territory). The decision by a rational unitary state to undergo an arms race is assumed as the result of a comprehensive evaluation process of the pre-existing own military capabilities, the national (political) level of ambition, the quality of information about the potential rival capabilities, and further elements like, *inter alia*, reaction curves or economic/industrial capacity in case of prolonged conflicts. In comparison to the complexity of the strategic interaction in a dyad of states, Richardson's model offered a mathematically increasingly complex but theoretically simple descriptive model, whose explanative power derives from the action-reaction on the rival's defence expenditures, previous own national defence expenditures and a more or less specific 'eagerness' of a state to confront another state in an arms race.[355] In another critique of the Richardson model, Stoll briefly showed that the model offers stark limitations exactly because of the mathematics involved. For example, an examination of defence expenditures from the NATO allies in the Cold War era led to a positive correlation result between the individual NATO allies (exempt Portugal), which represents a contradiction to the fact that all states involved were in the same military alliance.[356] In this empirical example on NATO allies' defence spending, it therefore cannot be said for sure, if the increase in military capabilities is the result of an increase in military capabilities of another state or just merely coincidence. Diehl suggested to establish a quantitative threshold by which an arms race should be better able to be identified. In that sense, a benchmark of an increase of 8% or more in defence spending or military personnel over at

[354] Glaser did not limit himself to the survey of external causes only. There is another subchapter in his work that addressed state internal factors responsible for arms races. See: Glaser, C. (2000): The Causes and Consequences of Arms Races, pp. 256-259.
[355] Glaser, C. (2000): The Causes and Consequences of Arms Races, pp. 253-256.
[356] See subchapter "What drives arms races" in: Stoll, R. (2017): To Arms, To Arms: What Do We Know About Arms Races?, Hyperlink: https://oxfordre.com/politics/view/10.1093/acrefore/9780190228637.001.0001/acrefore-9780190228637-e-350 (Last visit: 16.02.2022).

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least 3 years period by both states might support the hypothesis of an arms race between two surveyed states.[357]

Irrespective of the particularly strong impact that Richardson's model had on arms race theory, Intriligator and Brito suggested to adapt the model in order to take into account the changed politico-military environment. In that sense, the end of the Soviet Union marked the beginning of an age of insecurity derived from, *inter alia*, geopolitical shifts between powers or the proliferation of weapons of mass destruction. And even further, the researchers expected that the development and subsequent deployment of new types of weapon systems (both researchers addressed them as 'smart weapons', whereas in this doctoral thesis such weapon systems have already been introduced as PGM) might have a considerable impact on any arms races in the post-Cold War era to come.[358] Two such developments receive a more detailed examination in the subchapter on deterrence theory, but should already be mentioned at this point due to both having the potential to initiate an arms race in the domain of nuclear deterrence: Those developments are (1) the post-Cold War era modernisation of nuclear weapons, and (2) the evolution of ballistic missile defence.

The introduced approaches to examine dyads of state in view of arms races so far were very much focussed on quantitative analyses and are practically representative for field of study; the quantitative method is dominant in arms race theory.[359] Still influenced by the late Cold War, Lakoff and Bruvold argued that arms races offer qualitative dimension from two enablers that have so far not received much attention: (1) advances in military research & technology might provide the technological basis for an arms race through development of new weapon system that are superior in comparison to another state's military capabilities, and (2) the political decision-making in regard to starting, maintaining and ending an arms race by developing, producing and deploying said new weapon system. A notable example that combined both sources (and offers an elegant link to the above-mentioned evolution of ballistic missile defence) had been the U.S. Strategic Defense Initiative (SDI) that was already introduced in the subchapter 2.1.2, even though it never reached any production stage in the late 1980s.[360]

In order to cater for technological advances and growing number of nuclear weapons arsenals as a result of the bipolar arms race of the Cold War, political decision-makers of both sides

[357] Rider, T./Findley, M./Diehl, P. (2011): Just part of the game? Arms races, rivalry, and war, p. 90.
[358] Intriligator, M./ Brito, D. (2000): Arms Races, pp. 47-53.
[359] See subchapter "Recent Arms Race Studies" in: Stoll, R. (2017): To Arms, To Arms: What Do We Know About Arms Races?, Hyperlink: https://oxfordre.com/politics/view/10.1093/acrefore/9780190228637.001.0001/acrefore-9780190228637-e-350 (Last visit: 16.02.2022).
[360] Lakoff, S./Bruvold, W. E. (1990): Controlling the Qualitative Arms Race: The Primacy of Politics, pp. 399-407.

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decided to negotiate and establish arms control treaties with a view to (1) reducing the risk of a potentially devastating (nuclear) war, (2) limiting the damage in case that any arms control and deterrence mechanism fails, and (3) reducing the risk of ever-growing defence expenditures (thus enabling states under arms control to readjust their national budgets in favour of non-defence related public expenditures). A key element of arms controls of the Cold War era had been the reference to a 'strategic stability' between both nuclear armed superpowers. Based on 'Mutually Assured Destruction' (MAD) concept, which has already been introduced in the subchapter 2.1.2, no side should be put in a position, where its second-strike capabilities do not have the adequate strength in order to deter a first strike by the other power.[361] It is noteworthy that the collection of treaties did not only encompass limitations on the numbers of nuclear warheads for both sides, but also limitation on the types of weapons deployed. Amongst those that remained relevant in the post-Cold War era (at least for a time) were, *inter alia*, the 1972 Anti-Ballistic Missile (ABM) treaty and the 1987 Intermediate-Range Nuclear Forces (INF) treaty.[362] Arms control treaties have played an important cornerstone of the most important nuclear-armed NATO member state U.S. in their 'nuclear relationship' to the Soviet Union and succeeding Russia; and various U.S. administrations have made political commitments to reducing and limiting national military capabilities in the past in order to ensure strategic stability.[363] While the most recent developments, such as the 2019 U.S. withdrawal from the INF Treaty due to suspicious Russian opaqueness of the SSC-8 missile system[364], are outside the temporal scope of this doctoral thesis, the 2002 U.S. withdrawal from the ABM Treaty that laid the legal groundwork for the deployment of the U.S. national ballistic missile defence and the reserved reaction from Russia back then[365] definitively require more scrutiny, but since these elements are highly relevant for the research question, they are looked upon in detail in Chapter 3 from a theoretical perspective and empirically in Chapter 4. While arms control has been a minor detour within the remit of arms race theory, the political decision-making of states to gain more military security by acquiring arms in order to works hand-in-glove with efforts in arms control negotiations.[366] Thus, bargaining is another potential venue for states to gain further military security.

[361] Nye Jr., J. (1991): Arms Control and International Politics, pp. 148-151.
[362] Kydd, A. (2000): Arms Races and Arms Control: Modeling the Hawk Perspective, pp. 229 f.
[363] Countryman, T. (2019): Russia, China, Arms Control, And the Value of New START, pp. 14-19.
[364] For a more detailed sequential record from the perspective of NATO, see: NATO (2019): NATO and the INF Treaty, August 2019, Hyperlink: https://www.nato.int/cps/en/natohq/topics_166100.htm (Last visit: 07.09.2022).
[365] Rusten, L. (2010): U.S. Withdrawal from the Antiballistic Missile Treaty, pp. 2 f. and pp. 12 f., Hyperlink: https://ndupress.ndu.edu/Portals/68/Documents/casestudies/CSWMD_CaseStudy-2.pdf (Last visit: 07.09.2022).
[366] It is debatable, if arms control efforts contribute for stability or instability in an existing arms race, see: Gray, C. (1980): Strategic Stability Reconsidered, pp. 144-146.

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2.4.5 Bargaining theory

Conducting diplomacy and negotiations between states can be considered a supreme art in the field of international relations. Depending on the specific topic under negotiation and the number of states involved, the results from such bargaining processes might be able to impact domestic politics of states, regional inter-state orders, or the international system itself for years, if not decades or even more than a century[367]; either positively[368] or negatively[369].

Examining NATO from point of view of bargaining theory provides valuable insight into a military alliance with a large number of member states that are requires to unanimously agree on all alliance-wide policies. In the words of the current NATO's Secretary General Stoltenberg (as of 2023):

> "NATO is the most successful alliance in history because through the decades we have kept our commitment to protect and defend one another and because we have adapted as the world around us changes." (Stoltenberg)[370]

Considering that NATO was able to retain its role as a pivotal defence organisation for its member states, despite that its peer competitor Warsaw Pact had dissolved in 1991, the bargaining processes inside NATO and between NATO and third states should furthermore deserve particular attention in light of this dissertation.[371]

In this subchapter, two specific bargaining processes are presented: (1) Bargaining between the member states of a specific alliance inside an alliance framework, i.e. NATO allies negotiating in NATO committees or at NATO summits about a specific joint policy decision, and (2) Bargaining between NATO with a third state. It should be noted at this point that the NATO-

[367] Meerts, P. (2015): Diplomatic Negotiation. Essence and Evolution, pp. 219-242.
[368] For a positive defence-related example, referral should go the efforts on the ongoing elimination of chemical weapons. The founding Chemical Weapons Convention was put into effect in April 1997 together with the creation of the Organisation for the Prohibition of Chemical Weapons (OPCW), which became the 2013 Laureate of the Nobel Peace Prize. See: Walker, P. (2019): Three Decades of Chemical Weapons Elimination, pp. 6-13; and: Nobel Prize (2013): Organisation for the Prohibition of Chemical Weapons – Facts, 2013, Hyperlink: https://www.nobelprize.org/prizes/peace/2013/opcw/facts/ (Last visit: 28.08.2022).
[369] The 1938 Munich Agreement should be perceived as a particular dire example of international diplomacy in regard to foreign, defence and security policy. See: Hughes, R. G. (2013): The Ghosts of Appeasement: Britain and the Legacy of the Munich Agreement, pp. 688-716.
[370] New Atlanticist (2019): Atlantic Council Honors History's Most Successful Alliance, 30. April 2019, Hyperlink: https://www.atlanticcouncil.org/blogs/new-atlanticist/atlantic-council-honors-history-s-most-successful-alliance/ (Last visit: 28.08.2022).
[371] For an impressive plea for NATO's relevance, its role in history and in the post-Cold War era, see: The Catalyst (2015): NATO: Still Relevant in a Dangerous World, Hyperlink: https://www.bushcenter.org/catalyst/global-challenges/lloyd-nato-still-relevant-in-a-dangerous-world.html (Last visit: 16.07.2022).

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internal bargaining process takes precedence, given the fact that NATO works on unanimity and that the organisation has an interest to present itself unified vis a vis third states.

A NATO-internal bargaining situation can be interpreted on the basis of the classical game of a prisoner's dilemma. In accordance with Fearon's a two-state bargaining game model that form an alliance, both states i and j need to (1) agree on a certain political decision (bargaining phase), and (2) implement the joint decision (enforcement phase). It should be noted that enforcement of joint decisions by the alliance members represents a considerable challenge due to a missing central authority above individual states[372], hence the distinction view of bargaining and enforcement should be useful input from a theoretical perspective.

In the bargaining phase (1) of Fearon's model, state i's and j's utility is derived from a joint policy decision interval $X = [0,1]$. The utility of state i's optimal policy decision is $z \in X$ and utility of state j's optimal policy decision is $1 - z \in X$, thus state i prefers a joint policy decision closer to 1, while state j prefers the opposite one closer to 0. Let the range of potential agreements be $A = \{x, y\}$ under the condition $x > y$ in order to underline state i's preference for x versus state j's preference for y. The bargaining phase starts at $t = 0$ with negotiations between both states. Critical in the model is the so called 'quit time' (Fearon) at which state i either gives in to state j's preferred agreement y or vice versa state j gives in to state i's preferred agreement x. The 'quit time' reflects the ability of either state i and j to withstand the duration of non-cooperation on the specific issue at hand. For example, if the 'quit time' is $t_i < t_j$, state i gives in to state j's preferred joint policy decision y.[373]

The conduct of bargaining follows a 'bargaining protocol' (Powell), where the state i is first-mover and makes all-or-nothing offer that state j accepts, thus moving the model to the enforcement phase. If the offer is rejected by state j, the case of non-cooperation (as previous *status quo*) continues, while the costs from such a non-cooperation should be identical to a defection-defection decision of both states (thus exacerbating pressure for cooperation). An alternative protocol would be the change in the first-mover role from state i to state j in reaction to the rejection of the first offer by state j. In that sense, the first-mover offer could alternate between the two states for a theoretically unlimited amount of time, in case that no state gives in to the other's proposal.[374]

[372] The issue of anarchy in the international system has already been introduced in the subchapters on IR theory.
[373] Fearon, J. (1998): Bargaining, Enforcement, and International Cooperation, pp. 277-279.
[374] Powell, R. (2002): Bargaining Theory and International Conflict, pp. 2-4.

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The enforcement phase (2) begins after an agreement on a joint policy decision $z \in A$ has been brokered. Both states then play continuous prisoner's dilemma game with the following pay-off scheme in order to implement the agreement:

		State j	
		Cooperate	*Defect*
State i	*Cooperate*	$z, 1-z$	$-b, a$
	Defect	$a, -b$	$-c_i, -c_j$

Table 6: Per-unit-time payoffs in the enforcement phase in accordance with Fearon[375]

In this model, cooperation is a pareto-efficient solution, because (1) pay-off $a > 1$ for the state with the preferred joint policy option choice, while (2) the pay-off for a state j defecting one-sidedly from the non-wanted joint policy option may be $a - b < 0$. However, (3) when both states decide to defect from a joint policy decision, the individual pay-off is $b > c_{i\,or\,j}$, which would be worse for either state i or j, whose non-preferred policy decision was not taken as the commonly agreed policy.

In order to further loosen the restriction of the above model, Fearon introduced a time lag $\Delta > 0$ for the information flow of a state's defection from an agreed joint policy decision to the other state. Thus, mutual monitoring for compliance in regard to the implementation of an agreed joint policy decision is essential for the reliability of cooperation.

In addition, Fearon suggested to release two further restrictions in order to make the model more realistic. The first proposal is the change of the model from complete to incomplete information for the playing states. Such an adaption could be based on Bayesian economics, in which each state only knows his own cost of non-cooperation. Under these conditions, Fearon suggested that a State would most likely choose a more robust bargaining stance, if he believes that the cost incurred from non-cooperation is lower than the benefits received from negotiating an agreement with the other state through bargaining.[376]

Extending the argument above, the 'shadow of defection', i.e., a state seeking an alternative policy that might offer a higher pay-off than staying true to the bargained agreement, is a continuous risk for all kinds of bargaining situations.[377] Taking an empirical example from Europe, the majority of European NATO allies are members of the European Union (EU). From the end of the Cold War onward to the end of the research period of 2016, the EU member states

[375] Fearon, J. (1998): Bargaining, Enforcement, and International Cooperation, p. 278.
[376] Fearon, J. (1998): Bargaining, Enforcement, and International Cooperation, pp. 277-299.
[377] Powell, R. (2002): Bargaining Theory and International Conflict, pp. 4-7.

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have continuously worked on creating a stronger common European foreign, defence and security policy[378] framework. While it was not intended to replace NATO's role, it still provided those states an alternative option when cooperating in defence matters of mutual interest. At the same time, members of only one of those alliances might exert political pressure through vetoing certain decisions by one alliance that could be beneficial to the other one as well, e.g. Turkey's veto with a view to Cyprus in the sample case of the EU-NATO cooperation.[379]

Despite these limitations in complexity, Fearon's two-state bargaining model, as presented above, offers a good basic introduction to negotiations between states that are part of an alliance. However, it falls short of explaining the outcome of a two-player game theoretical model, where one side is a military alliance (a 'collective' represented by unitary state i) and the second player is third state j. In addition, the cost of non-cooperation might not necessarily be the most ideal theoretic interpretation of the result, when a military alliance and a third state do not come to an agreement.

Fortunately, Fearon has developed another two-state bargaining model, known as the 'bargaining model of war', which might reflect the bargaining situation between a military alliance and a third state more adequately than the previous model. Based on the hypothesis that wars are principally *ex-post* inefficient solutions[380], Fearon identified three conditions that motivate states to pursue a defection *or* war strategy rather than other bargaining strategies:

(1) The existence of private information and the chance for misinterpretation, e.g. through over- or underestimation of one's own or the enemy's military capabilities,

(2) the lack of commitment from states regarding the implementation of a negotiated agreement due to incentives for defection (e.g. offensive advantage that benefits the attacker or mistrust of commitment of the other state that leads to a preventive war), and

(3) the indivisibility of the issue at stake (in rarer cases, such as the question of 'who will be king?').[381]

Translating the bargaining model of war into a visually comprehendible representation might be helpful for understanding the states starting positions, there preferred pay-offs, their

[378] For an overview with further links to the 'Common Security and Defence Policy' (CSDP) of the EU, see: EEAS (2021): The shaping of a Common Security and Defence Policy, Hyperlink: https://www.eeas.europa.eu/eeas/shaping-common-security-and-defence-policy_en (Last visit: 16.07.2022).

[379] Hofmann, S. (2009): Overlapping Institutions in the Realm of International Security: The Case of NATO and ESDP, pp. 45-49.

[380] Fearon's derivation for that hypothesis is the following assumptions: (1) States want gain an expected ex-ante pay-off expected from going to war, but (2) they have to pay the cost for fighting. Subsequently, the states would be better off, if they agreed on the resolution before going to war (thus, not suffering the cost of fighting). see: Fearon, J. (1995): Rationalist Explanations for War, pp. 383 f.

[381] Fearon, J. (1995): Rationalist Explanations for War, pp. 379-410.

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bargaining range and the thresholds, why demarcate the advantage of a war strategy versus the bargaining result.

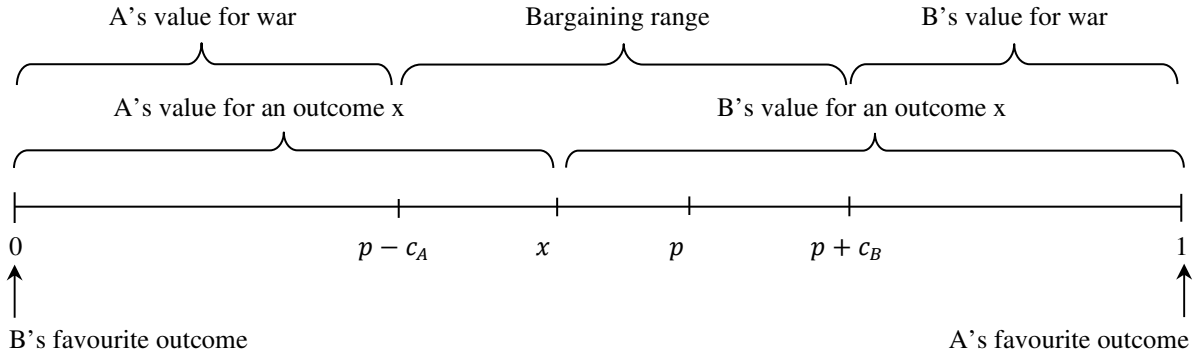

Figure 2: Fearon's Bargaining Model of War[382]

In this above model, there are two states A and B that initiate bargaining over a divisible good (represented by the interval $X = [0,1]$. The optimal payoff strategies would be the maxima $A = 0$ and $B = 1$ for either state. Both states can apply a war strategy with a positive value of $c_A, c_B > 0$, however both states are also free to negotiate any distribution of the good between themselves, thus sharing the divisible good without a costly war. If both states accept a bargaining solution, the share of the good manifests the new *status quo* and the game ends. However, one state might want to initiate a war to gain all of the good, while the looser of the war subsequently receives a 'zero' pay-off. In case that A decides to pursue a war strategy, the winning probability for A is $1 > p > 0$ and at the opposite for B it is $1 - p$, thus p reflects a comparison of A's military capabilities versus the military capabilities of B. Both A and B desire to move the share on the interval closer to their optimal payoff strategy. This requires both states to make considerable investments into the war effort c_A or c_B. If the payoff from a war strategy is neutral to the gain of the good on both sides of the scale, a bargaining window of opportunity for negotiations for a peaceful settlement of the division of the good opens up. If either state applies a war strategy, the subsequent utility functions for a specific outcome of the conflict x are $U_A(x) = p - c_A$ and $U_B(1 - x) = 1 - p - c_B$. The boundaries of the bargaining range are therefore set by $[p - c_A\ p + c_B]$. In order to enable a bargaining solution, the following three assumptions are made in the model:

(1) The expectations regarding the individual probability of winning the war depends not only on one's own military capabilities, but also the military capabilities of the enemy state.

[382] Fearon, J. (1995): Rationalist Explanations for War, p. 387.

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(2) States are risk-averse (or at least risk-neutral). If there is an opportunity to gain a marginal unit more through a bargaining than from a conflict with a chance of losing fifty-to-fifty, the state would rather choose a bargaining solution.
(3) The good must be divisible and be placeable on an interval that offers a bargaining range in addition to a war strategy payoff. If the good is not divisible due to its nature (the previous example of the throne in a monarchy) or if there is no bargaining range due to the incompatibility of national interests of two states (e.g. claiming the Crimean peninsula as national territory), then a war strategy might be the only feasible way for a state to realise its interests by unilaterally attempting to change the *status quo*.[383]
While Fearon's bargaining model of war differentiates each state's bargaining strategy only in negotiation versus defection/initiation of war strategy, the empirical reality a variety of examples of states applying all sorts of strategies in order to press another state into compliance in a bargaining situation.
For a selection of a few noteworthy examples of bargaining strategies that states could use to achieve a higher share of the divisible good than the other would be open to give up in a bargaining situation, Altman proposed the following brief typology ordered in accordance with their increasing intensity:

Crisis Strategy	*Coercive Threat*	*Unilateral Imposition*	*Signals of Resolve*
Coercion	Necessary	No	Necessary
Imposed pressure	Necessary	Partially (costs only)	Inherent to the imposition
Fait accompli	Unnecessary	Yes	Unnecessary

Table 7: How states make gains in crises according to Altman[384]

For explaining the different strategies, a generic conflict scenario might be helpful: Let state j be an aggressive state that wants to challenge state i over the *status quo* of the international system. State j then announces its discontent with the *status quo*, either verbally e.g. in inter-state consultations or through public declarations, but could extend to include some form of action, such as conducting military exercises or increasing patrols of the air force in international airspace but moving closer to state i's airspace. Such 'signals' may be perceived by state i as a threat, depending on the condition of the experiences that state j made with state j based on (1) geographic proximity and thereby extent of previous exposure to state j's foreign,

[383] Fearon, J. (1995): Rationalist Explanations for War, pp. 386-390; and: Leventoglu, B./Tarar, A. (2008): Does Private Information Lead to Delay or War in Crisis Bargaining?, pp. 536 f.; and: Garfinkel. M./Skaperdas, S. (2007): Chapter 22 – Economics of Conflict: An Overview, pp. 667-670. In: *Sandler, T./Hartley, K. (eds.): Handbook of Defense Economics, vol. 2, Defense in a Globalized World*.
[384] Altman, D. (2018): Advancing without Attacking: The Strategic Game around the Use of Force, p. 69.

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defence and security policy, (2) the reputation of state j in terms of aggressiveness in communication and action towards state i or other states, and (3) the extent of state j's military capabilities, including its power projection in the direction of state i.[385] For brinkmanship, a state j needs to have the political willingness and the necessary military capabilities for a conflict escalation. A simple 'escalation ladder' could like look like this: (1) threaten the use of military, (2) mobilise armed forces, (3) act through military engagements against state i, and (4) fight resisting military forces of state i.[386] The concept behind state j's escalation strategy garnered considerable traction in the early- to mid-time of the confrontation between the nuclear armed superpowers, becoming known as 'nuclear brinkmanship' to a wider public.[387]

From Altman's typology, the most common crisis strategy is represented by simple 'coercion', wherein a state needs to deploy its military forces in the vicinity of a geographic crisis area. Coercive bargaining can be a forceful companion to inter-state negotiations by making use of national armed forces below the threshold of direct military confrontation. Potential strategies in relation to the deployment of military forces might span from pronouncing a verbal 'red line', which once crossed would inevitably lead to war, over military manoeuvring in contested geographic spaces ('gunboat diplomacy'), to targeting the other state's maritime or air forces in radar lock and even non-back-traceable cyber-attacks on one state's civilian or military infrastructure. The central pillars of a coercion as a bargaining strategy are (1) the signalling of the politico-military intentions of state i to state j and (2) brinkmanship, i.e. the willingness of state i for an escalation of the crisis/conflict.[388]

As second strategy, 'Imposed pressure' encompasses by one state putting politico-military pressure, including increasing costs, on another state without attacking. Such a strategy might be more or less obvious connection between the imposing state and the pressured state. For clarity, there are a number of examples for imposed pressure, e.g. the naval blockade of the U.S. against Soviet transport ships in the 1962 Cuban Missile Crisis or the delivery of weapons by a state to another state or interest group that is engaged in conflict with the pressured state (such as U.S. weapons deliveries to mujahideen fighters following the 1979 Soviet invasion of Afghanistan, or more recently, Western weapons supplies to Ukraine in response to the 2022 Russian invasion of Ukraine).

[385] Sechser, T. (2018): Reputations and Signaling in Coercive Bargaining, pp. 318-322.
[386] Fearon, J. (1994): Signaling versus the Balance of Power and Interests: An Empirical Test of a Crisis Bargaining Model, pp. 239-242.
[387] For a glimpse on nuclear brinkmanship, see: Powell, R. (2015): Nuclear Brinkmanship, Limited War, and Military Power, pp. 589-593.
[388] Altman, D. (2018): Advancing without Attacking: The Strategic Game around the Use of Force, pp. 61 f.

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The final and potentially risky strategy, the Fait accompli encompasses a rapid military force deployment in order to make quick limited gains, e.g. in territory. Such a strategy leads to unilaterally results, since the strategy once successfully applied, takes direct effect. There is no previous signalling towards the other state(s) necessary, because it is intended by the acting state as a surprise move. However, sufficient military capabilities as a show-of-force are required as a deterrent against other states, if they decided to respond militarily in order to remove those gains from the aggressive state. The 2014 illegal annexation of Crimea by Russia could be taken as a contemporary empirical example of such a strategy.[389]

If coercive bargaining is valued in accordance with a 'ladder of escalation', the next step after a Fait accompli might be considered a 'declaration of war' by state i against state j. Before going into the details of the most extreme step in the bargaining process, it should be noted that a formal declaration of war is neither required for this strategy, nor a necessary precondition. Since 1945, there have been many examples of hostilities between states escalating to direct exchange of military violence between armed forces, damage to civilian infrastructure, and casualties from civilian populations; either as a result of a surprise attack, in a civil war, or as a consequence of the implementation of a UN Security Council Resolution.[390]

The bargaining models presented so far have focussed on the either intra-alliance relations or state-to-state interactions. For integrating an intra-alliance and alliance-third state bargaining processes, Manzini and Mariotti proposed a sound two-step theoretical bargaining model with a view to integrate the intra-alliance negotiation with the alliance-third state negotiations. The intention of both researchers was to test the assumption, if the unanimity voting procedure in an alliance leads to more aggressive joint policy decisions in comparison to the decisions made through majority-based voting. The researchers assumed that the alliance-internal bargaining based on unanimity rule benefits the more aggressive alliance member states, because they have the opportunity to block any decision in order to pursue their national interest. Consensus on a topic might then just be reached, when the moderate states allow for a 'firmer' joint policy decision. Since those distinctions between decision-making procedures might be of lesser importance to the research question, the proposed two-step bargaining model should nevertheless be helpful in understanding of the empirical observation of NATO joint decisions, including the alliance's negotiation stance with Russia as a third state. The model is furthermore based on the assumption that Alliance member states share preferences in regard to the negotiation outcome, but with different degree of national 'stress'. This means e.g. that all states

[389] Altman, D. (2018): Advancing without Attacking: The Strategic Game around the Use of Force, pp. 66-70.
[390] Greenwood, C. (1987): The Concept of War in Modern International Law, pp. 283-306.

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in the alliance are interested in an increase in military security (a pure public good), but some states more than other due to their geographic location for example (such states might also be satisfied with a nationally desired share of the impure public good, like NATO force deployment for deterrence purposes).[391]

In the two-step bargaining model of Manzini and Mariotti, the alliance member states negotiate and decide through an internal procedure P and solution, called A in this case, which is then suggested to state j. In response, state j might accept, which would lead to an alliance-third state agreement A or rejected with state j potentially proposing an alternative solution back to the alliance. The researchers conclude that doctoral thesis, the results of such an internal procedure would be (1) impacted by the alliance member(s) with a priority in interest in and the robustness of the national stance towards the issue at stake.[392]

It is important to note in such an alliance-third state negotiation model the possibility of a third state exploiting the intra-alliance bargaining process in order to disrupt the alliance as a unitary actor is not covered. The majority of the previous theories (except the Manzini/Mariotti model) do usually treat a 'collective of states', such as NATO, as a unitary state i, thereby simplifying the analysis of complex empirical observations of alliance negotiations. However, a third state j, such as Russia, might want to pursue a disruptive or 'wedging' strategy (Izumikawa) by coercing or rewarding a targeted state k to 'move closer' to state j's position, which in turn might trigger the dominant state i inside the alliance to respond binding strategy towards state k.[393] The employment of such a wedge strategy by state j can be decisive in the outcome of negotiations between state j and an alliance and therefore such more subtle nuances in the negotiation positions between a third state and the transatlantic alliance need to be addressed on case-by-case basis.

2.4.6 Deterrence theory

In this subchapter, two streams of deterrence theory are presented. First of all, classical deterrence theory that has been developed since the inception of game theory (e.g., game of chicken) is presented in subchapter 2.4.6.1. In the subsequent subchapter 2.4.6.2, a specific variant known as Perfect Deterrence Theory (*or* PDT) is introduced.

[391] Manzini, P./Mariotti, M. (2005): Alliances and negotiations, pp. 128-130.
[392] Manzini, P./Mariotti, M. (2005): Alliances and negotiations, pp. 130-137, and 139 f.
[393] Izumikawa, Y. (2013): To Coerce or Reward? Theorizing Wedge Strategies in Alliance Politics, pp. 505-509.

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At this point, it should be mentioned that PDT was chosen by the author as the most practicable game-theoretic approach for answering the research question, but this selection is justified more thoroughly in the interim conclusion in subchapter 2.5.

As last subchapter before the interim conclusion, subchapter 2.4.6.3 provides an overview of the existing empiric research literature from PDT, which allows a first impression of the research gap that is filled by this dissertation.

2.4.6.1 Classical deterrence theory

Despite being introduced as one of the last theoretical contributions, classical deterrence theory[394] actually represents the key field of study from Defence Economics discipline in view of the research question. It must be stressed that understanding deterrence from a conceptual and theoretical point of view requires considerable pre-knowledge. This does entail the various 'subconcepts' of deterrence, such as MAD for nuclear deterrence or the risk of force thinning for conventional deterrence. But furthermore, the politico-military context in which deterrence is realised, such as extended nuclear deterrence provided by the U.S. within the remit of NATO, needs to be taken into account in the theory as well. In this sense, the previous conceptual and theoretical subchapters of Chapter 2 were also intended as 'enablers' for an appropriate introduction to deterrence theory. As common as in other fields of research, deterrence theory consists of a collection of different models and thus subchapter provides a short-run through three selected expressions of deterrence theory: The 'Game of Chicken' game theoretical model, classical deterrence model derived from Schelling and further refined over the course of the Cold War[395] as well as Quackenbush's and Zargare's more recent perfect deterrence model.[396] Lastly, this subchapter is complemented by case-specific models on nuclear deterrence and the impact of ballistic missile defence on deterrence.

From a contemporary perspective, deterrence and its related theoretical contributions appear somewhat 'out-of-fashion' in the wider academic community since the end of the Cold War. In a 2003 research essay, Gray declared deterrence in a state of crisis and called out for the

[394] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 3-8.

[395] There are different positions on the constitution of deterrence theory as subdiscipline. Morgan argued for one singular deterrence theory with different sets of deterrence strategies, whereas Zagare proposed to assign the term 'classical deterrence theory' to all theories except the 'new kid on the block' namely perfect deterrence theory (of which, unsurprisingly, Quackenbush and Zagare are the 'inventors'). For simplicity, Quackenbush's/Zagare's distinction is applied in this doctoral thesis. For reference, see: Quackenbush, S. (2011): Deterrence theory: where do we stand?, pp. 742 f.

[396] For reference see the subchapter 'Theories of Deterrence' in: Quackenbush, S./Zagare, F. (2016): Modern Deterrence Theory: Research Trends, Policy Debates, and Methodological Controversies, Hyperlink: https://academic.oup.com/edited-volume/41327/chapter/352325980#oxfordhb-9780199935307-e-39-div1 (Last visit: 09.03.2022), and Sörenson, K. (2017): Comparable deterrence – target, criteria and purpose, pp. 198-200.

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continued relevance of the theories besides the ample critique that the classical deterrence theory has received due to misunderstandings of its conceptual and theoretical foundations.[397] Fortunately for the discipline, deterrence theory has been far from inert in the post-Cold War as Zagare's survey of the latest research contributions from the field in response to a critical assessment of deterrence in a state of "semiretirement" (Gray). In that survey, Zagare did not restrict himself to counting the more recent research contributions, but also directly commented on the actual content of the theory. In that sense, he took note of the long history of deterrence theory based on a decision-oriented approach (e.g. the game theoretical models presented in this subchapter are ample proof for this), but stressed that deterrence should also be interpreted through the perspective of structural theory as well. This is an interesting input, since deterrence theory can be adapted through this way in order to close the gap to, *inter alia*, Neorealism and Neoinstitutionalism. In a nutshell, deterrence theory requires both theoretical perspective in accordance with Zagare:[398]

> "It is well appreciated that deterrence is a type of power relationship, and power is obviously a critical determinant of system structure. But deterrence is also, in part, a psychological relationship, which implies that it must also be understood in decision theoretic terms. To look at deterrence, then, as strictly a structural problem is to miss a core aspect of the problem. And to look at deterrence as solely an opportunity for a policy choice is to overlook the context in which such relationships are played out." (Zagare)[399]

Despite the risk of balancing deterrence theory in favour of decision-making theory, this subchapter begins first of all with a presentation of the simpler game-theoretical approaches for initial insights into this domain of the Defence Economics discipline. It should also be noted that Zagare and Quackenbush have subsumed both decision-theoretical and structural approaches under the term 'classical deterrence theory'.[400] In this sense, the first part of classical deterrence theory can easily be introduced as a 'Game of Chicken', where two states threaten each other on the basis of the military capabilities in order to persuade each other that an attack would lead to inevitable self-destruction, is presented by a normal-form game in the table below:

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[397] Gray, C. (2003): Maintaining Effective Deterrence, pp. v-xi (summary pages), Hyperlink: https://press.armywarcollege.edu/cgi/viewcontent.cgi?article=1786&context=monographs (Last visit: 10.09.2022).
[398] Zagare, F. (2006): Deterrence Is Dead. Long Live Deterrence, pp. 115-119.
[399] Zagare, F. (2006): Deterrence Is Dead. Long Live Deterrence, p. 116.
[400] See the subchapter 'Theories of Deterrence' in: Quackenbush, S./Zagare, F. (2016): Modern Deterrence Theory: Research Trends, Policy Debates, and Methodological Controversies, Hyperlink: https://academic.oup.com/edited-volume/41327/chapter/352325980#oxfordhb-9780199935307-e-39-div1 (Last visit: 09.03.2022).

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		State j	
		Evade	*Confront*
State i	*Evade*	$3, 3$	$2, 4$
	Confront	$4, 2$	$1, 1$

Table 8: Normal form 'Game of Chicken' with pure strategies as displayed by Stone[401]

State i and j decide in parallel, if they want to confront or evade the other. The pareto-optimal solution would be that both evade, because no harm would be done and nobody might be blamed to have given in. There are two Nash-Equilibria, wherein state i or j either evade, while the other might have chosen confront. The pay-off from such a 'Game of Chicken' played in the context of international crises would obviously favour the state that stood firm. Thus, following a rational choice logic, states would nevertheless prefer such an outcome over the risk of potential conflict, thereby making the pure risk-averse strategy instead of a pure *status quo* challenge strategy a more common choice. This would mean that states are more susceptible to coercive diplomacy and the likelihood of any conflicts rather limited. From an empirical point of view, such a result from the 'Game of Chicken' appears subsequently rather counterintuitive, because there are conflicts between states and states often stand firm in case of confrontation. In this sense and by deviating from a pure strategy game, a state could also decide to pursue a mixed strategy instead, wherein the specific strategy is chosen by the state with a specific probability. Then, there is a chance that both states might choose a confront strategy with a critical escalation occurring as an outcome; such a particular 'fear' is the basis for nuclear deterrence with its MAD concept.[402] In order to cater for probabilities, Snyder proposed an adapted pay-off matrix that also includes randomness of mixed strategies:

		State j (aggressor, w/t critical risk .50)	
		Comply (.40)	*Stand Firm (.60)*
State i (defender, w/t critical risk .60)	*Comply (.50)*	$0, 0$	$-10, 10$
	Stand Firm (.50)	$5, -5$	$-20, -20$

Table 9: Normal form 'Game of Chicken' with mixed strategies as displayed by Snyder[403]

In Snyder's model, state j is designated as aggressor, while state i is the defender. The game is designed as zero-sum model, if one complies and the other stands firm, the pay-off is balanced

[401] Stone, R. (2001): The Use and Abuse of Game Theory in International Relations: The Theory of Moves, p. 219

[402] Stone, R. (2001): The Use and Abuse of Game Theory in International Relations: The Theory of Moves, pp. 218.

[403] Snyder, G. (1971): "Prisoner's Dilemma" and "Chicken" Models in International Politics, pp. 88.

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at zero. In case that both states choose comply, the result is assumed to reflect a peaceful bargaining solution without conflict; this has been addressed in the 'Bargaining model of War' in the last subchapter. If both states stand firm in their stance, the end result would be a war with the subsequent devastating damage to both states; defence in form of actual military capabilities available to each state would then become most relevant in order to reduce said damage. The most interesting results from a deterrence point of view at this point represents the likelihood of (1) the aggressor giving in and complying with the *status quo ante*, and (2) the defender giving in to the demands of the aggressor and thereby accepting a new *status quo*. Since both states have full information, they know each other's credibility behind their specific strategy choices. The defending state i understands that state j's probability/credibility for confrontation ('Stand Firm') is .60 and state j's probability to comply is .40, while state i's 'Stand Firm' to 'Comply' balance is .50, .50. The critical risk values the different strategy combinations of pay-offs with the probabilities as given in the normal-form game scheme is calculated as per below:

$$\frac{uF_1 - uC_1}{uF_1 - uW}\,^{404} \tag{24}$$

If the critical risk for state i derived from the pay-off differences from the strategy choices is equal .50 and for state j equal to .60, either states would be indifferent to the strategy choices. If the aggressor's probability/credibility for confrontation is higher than the critical risk of the defender, the defender would give in. Likewise, if it is the other way around, the aggressor backs down. In the extreme cases both states either believe that their critical risk is higher than the other state's threat, a war may occur, while when both states think that the other state's threat is higher than one own's critical risk, a bargaining solution could be possible.[405]

In order to add more complexity to the just presented 'Game of Chicken', the model can also be transformed from a parallel-decision with complete information between both states into (1) a sequential decision model with (2) partial incomplete information, i.e. the challenger does not know the defender's probability choosing between a compliance or firmness strategy, while the defender has full information on the challengers probabilities. In such an extended form

[404] The critical risk calculation is a division with uF_1 as the utility of successful firmness, uC_1 as the cost of compliance, and uW as cost of war. The "1" indicates the phase of the negotiations, wherein aggressor state j already made an alternative offer to the existing *status quo* to state i. The state with the larger difference between its own critical risk and the risk from a threat execution by the other state, will make the concessions. See footnote no. 14 in: Snyder, G. (1971): "Prisoner's Dilemma" and "Chicken" Models in International Politics, p. 89.

[405] Snyder, G. (1971): "Prisoner's Dilemma" and "Chicken" Models in International Politics, pp. 87-90.

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sequential game (figure below), there are two states, whose roles are predetermined. The challenger makes the first move by challenging the *status quo*.

If the defender resists, the challenger can either confront (WAR solution), or back down from its threat (CAPitulation solution). If the challenger has threated the defender and the defender backed down, a new *status quo* to the benefit of the challenger is established (ACQuiescence solution). If the challenger does not threaten at all in the beginning, the *status quo* remains (Status Quo solution). The researchers assumed that either state might pursue its strategy with a hard or soft posture, thus modifying the order of preference for the respective outcomes WAR, CAP, ACQ and SQ. The difference in the priority-settings is that the hard challenger and defender prefer war over acquiescence, whereas the soft challengers' and defenders' choices are vice versa.[406]

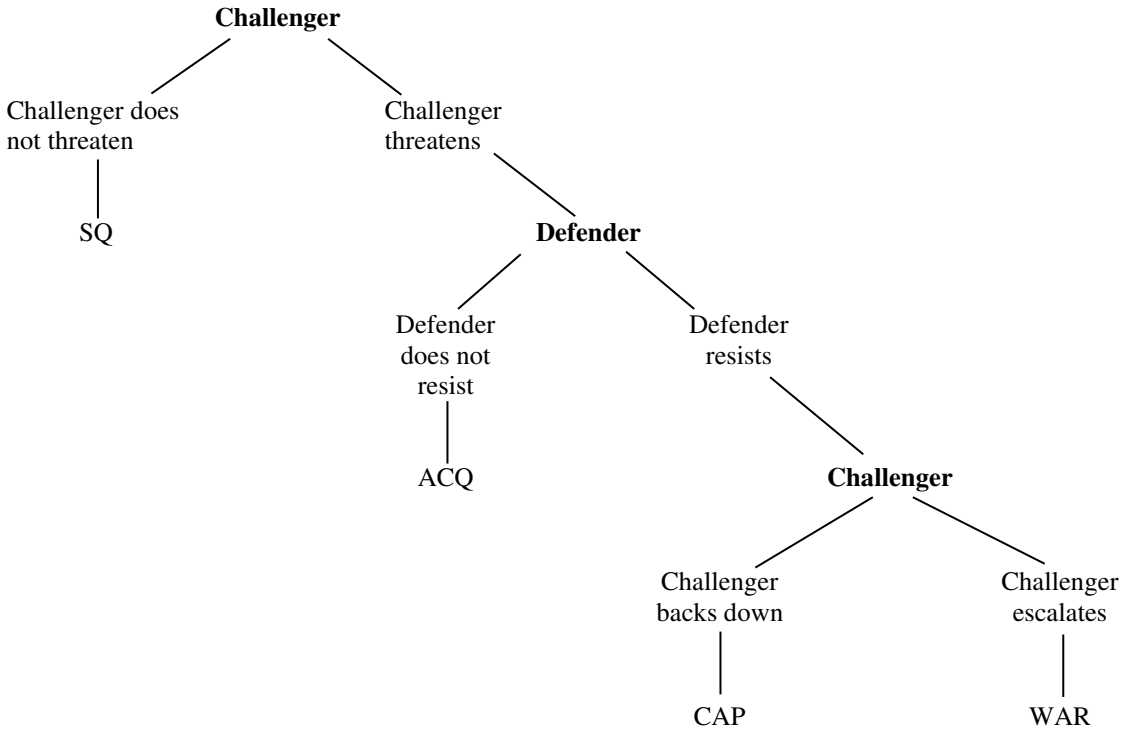

Figure 3: Sequential extended-form deterrence game according to Carlson/Dacey[407]

The probability for any challenger to confront a hard defender is p, while the probability to confront a soft defender is $1 - p$. The individual values of the preferences for a hard challenger would be $v(ACQ) > v(SQ) > 0 > v(WAR) > v(CAP)$. The critical risk threshold for that hard challenger is subsequently:

[406] The individual preferences are: ACQ > SQ > WAR > CAP (hard challenger); ACQ > SQ > CAP > WAR (soft challenger); as well as: CAP > SQ > WAR > ACQ (hard defender); CAP > SQ > ACQ > WAR (soft defender). See: Carlson, L./Dacey, R. (2006): Sequential Analysis of Deterrence Games with a Declining Status Quo, pp. 183 f.

[407] Carlson, L./Dacey, R. (2006): Sequential Analysis of Deterrence Games with a Declining Status Quo, p. 183.

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$$\frac{p}{1-p} = \frac{v(ACQ) - v(SQ)}{v(SQ) - v(WAR)} \qquad (25)$$

In case that the left side of the above equation is smaller than the right side, it is assumed that the challenger will always pursue a hard confrontative strategy, and a soft complying strategy in the opposite case.[408]

Both variants of a 'Game of Chicken' as presented, show that there are two essential factors, if both states are able to choose from a mixed strategy: (1) The amount of threat credibility of an attacking and defending state, and (2) the critical risk threshold by which an attacking and defending state choose confrontational and complying strategies.

In regard to the question of threat capability, Zagare showed that this specific but essential piece of mutual deterrence reflects itself a 'prisoner's dilemma' game, wherein a defender interesting in retaining the *status quo* needs to 'emanate' a threat towards challenger by (1) having capabilities available to inflict damage on the other state, which (2) are credible in terms of persuading the other state to remain at the *status quo*, and (3) are of a stable nature by continuously discouraging the challenger from attempting a change of the *status quo*.[409]

It must be stressed that the creation of such a threat by a defender towards a challenger represents a major and sensitive task on its own. The defender might not want to signal aggression by a massive build-up of military capabilities himself, thus prompting the aggressor to engage the defender in an arms race, and neither does the defender want to encourage the aggressor to launch a preventive or (even precautionary) war due to the aggressor believing that his 'window of opportunity' for a military solution might be closing (in the future).[410] In this sense, if both, the attacker's and defender's military capabilities are balancing that neither state can gain an advantage by a military first strike against the other, a state of 'strategic stability' can derived. Such a state does not necessarily mean 'peace', but rather a condition wherein either states would lose more than they gain from going to war.[411]

In regard to the challenge of identifying the critical risk threshold, there are three decisive parameters in accordance with Schelling that are part of bargaining theory, but could easily be applied to this part of deterrence theory as well: (1) The context of the issue at stake, which might for one state be of a more critical nature than for others, as well as (2) the skill by which

[408] For reference, including the derivation of the equation, see: Carlson, L./Dacey, R. (2006): Sequential Analysis of Deterrence Games with a Declining Status Quo, pp. 183-188.
[409] Zagare, F. (1985): Toward a Reformulation of the Theory of Mutual Deterrence, pp. 156-159.
[410] Gray, C. (2007): The Implications of Preemptive and Preventive War Doctrines: A Reconsideration, pp. 11-16, Hyperlink: https://press.armywarcollege.edu/cgi/viewcontent.cgi?article=1676&context=monographs (Last visit: 11.09.2022).
[411] Brams, S./Kilgour, D. M. (1987): Threat Escalation and Crisis Stability: A Game-theoretic Analysis, pp. 833-835.

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responsible decision-makers of each state signal their intentions, including threats. This could roughly be described as 'statesmanship', while it is not only limited to individual leader's chosen strategy, but also tactics and cunning in their implementation.

Lastly and potentially the most important parameter, (3) the willingness to suffer, which includes, *inter alia*, the resilience of a population to withstand an enemy state dealing extensive damage to one's own lives and infrastructure.[412] Together with the military capabilities, the three 'soft factors' just introduced provide the basis for any inter-state interaction, when a challenger engages a defender and the defender determines, if a 'stand firm' strategy is a rational response under the given parameters.

Recalling the Zagare's description of classical deterrence theory at the beginning of this subchapter and considering that the game-theoretical perspective has just been introduced through the example of a 'Game of Chicken', the structural approach needs further coverage.

In accordance with Quackenbush, the structural variant of classical deterrence theory is closely linked to the 'balance of power' approach, which has been introduced in the chapter on Neorealism. It is noteworthy that nuclear deterrence plays a particularly prominent role and conventional deterrence seemed marginalised in the discipline for long-time; this gap was eventually closed by Mearsheimer's 1983 seminal contribution on conventional deterrence.[413]

The collection of research from classical deterrence theory commonly rested on two key assumptions, namely (1) that there is a monotonical relationship between the probability of war and the cost of war under *ceteris paribus* conditions. Thus, conflicts become less likely, if the costs of war rise; accidental wars due to misinterpretation etc. remain possible; and (2) that asymmetrical distribution of military capabilities provide the foundation of an increase in the likelihood of military conflicts, because more powerful states are inclined to use the capabilities to further their national interests, while smaller states tend to comply following coercive diplomacy.[414] Both assumptions have not been taken by the research community without critique. In regard to the assumption of less conflict as a reaction to rising costs of warfare, Chang and Luo have shown that the armament level as a precondition for deterring an aggressor has a cost of its own. Subsequently, when the costs of war are lower than the settlement costs

[412] Lebow, R. (1996): Thomas Schelling and Strategic Bargaining, pp. 555-563.
[413] Quackenbush, S. (2011): Deterrence theory: where do we stand?, p. 743.
[414] See the subchapter 'Theories of Deterrence' in: Quackenbush, S./Zagare, F. (2016): Modern Deterrence Theory: Research Trends, Policy Debates, and Methodological Controversies, Hyperlink: https://academic.oup.com/edited-volume/41327/chapter/352325980#oxfordhb-9780199935307-e-39-div1 (Last visit: 09.03.2022).

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(which include the costs from the previously identified optimal 'weapon' allocation of each state), a war might be a cost-efficient solution and potentially a Nash-Equilibrium.[415]

The second assumption offers a contradiction to the insights from the previously introduced 'Bargaining Model of War', which assumes that it is not the asymmetry in resource distribution, but rather an actual or perceived balance in the resource distribution that might tempt one or both of the states to test the *status quo* with a view to changing it into a more preferred direction.[416] Lebow and Stein criticised classical deterrence because of the assumption that attackers would represent archetypical risk-prone gain maximisers, whereas at least three other motivations for attackers exist that make challenging the *status quo* rational, namely risk-prone loss minimisers, risk-averse gain maximisers, and risk-averse loss minimisers.[417]

As a pointed extension of the critique, researchers of the discipline questioned the 'threats that leave something to chance' (Schelling) behavioural strategy, and the 'paradox of mutual deterrence' (Zagare/Kilgour) as derivatives of the above mentioned two key assumptions in particular. Under the 'threats that leave something to chance' strategy, it is assumed that states make a credible threat in terms of military retaliation with potential disastrous (nuclear) escalation. Considering that the consequences under 'mutually assured destruction' will inevitably lead to self-destruction, if the state realises its threat, the declaration of the threat itself should not be considered rational.

Nevertheless, the nuclear deterrence rests essentially on the assumption that there might be a situation, wherein a state threatens another one and the other one does not give in, thereby risking a catastrophic war. Alternatively, signals from one state might be misinterpreted by the other state that could lead to an accidental war. The 'paradox of mutual deterrence' is derived from a 'Game of Chicken' situation, wherein both attacker and defender conduct their moves sequentially. The decision outcome 'Comply'/'Stand Firm' represents a Nash-Equilibrium, regardless who of the two players chooses them. Both choosing 'Stand Firm' would lead to war that no playing state desires. Thus, if challenged by the attacker, the defender would by rational decision-making trying to avoid the war, however under the assumption of complete information, the challenger would always know that such a rational decision by the defender would lastly lead to the defender's compliance. If the defender decides to communicate its unwavering will to stand firm, the attacker might back down and the return to the *status quo* as

[415] Chang, Y.-M./Luo, Z. (2013): War or Settlement: An Economic Analysis of Conflict with Endogenous and Increasing Destruction, pp. 23-46.
[416] Reiter, D. (2003): Exploring the Bargaining Model of War, p. 33.
[417] Lebow, R./Stein, J. (1989): Rational Deterrence Theory: I Think, Therefore I Deter, pp. 209-212.

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solution or if the attacker really attacks, the defender might face the decision to back down anyways, because the above disastrous consequence of a war is still not rational.[418]

2.4.6.2 Perfect Deterrence Theory

In reaction to those critical gaps in the logic of classical deterrence theory, Quackenbush, Zagare and Kilgour have made a considerable effort since the 2000s to establish an updated form of deterrence theory that corrects the contradictions in the classical approaches as presented above. While their specific efforts in theory-building is not directly relevant for answering the research question, it is nevertheless a noteworthy approach to integrate new findings and known theoretical shortfalls to the established deterrence theory.

This new form of deterrence theory, dubbed Perfect Deterrence Theory (*or* PDT), rests on three assumptions: (1) The players, namely the states, are rational actors, (2) the states act in a differentiated way based on their national prioritisation-setting regarding the policy strategies (hard versus soft, i.e. if they prefer conceding over conflict), and (3) thus, the international system is not so much anarchic, as the rationalist IR and classical deterrence theories suggested, but rather hierarchic.[419]

Putting a presentation of the theory based on those three assumptions in a nutshell, PDT derives from the 'Paradox of Mutual Deterrence', as presented above, and a critique on the policy proposal of acquiring further arms without limitation in order to maximise military security by increasing the cost of conflict, while thereby lowering the probability of such a conflict. In accordance with PDT, all solutions that are sub-game perfect Nash Equilibria[420] should be considered as the rational strategy to be taken by a state in a two-state sequential game, shown below.[421]

Following backward induction, the Defender at node 2 needs to choose either concession leading to the victory of the challenger or denial, which is then followed by war. Given that the pay-off from denial is higher than from concession ($2 > 1$), the Defender will reasonably choose denial. The Challenger has to take the decision of either cooperation or defection at node

[418] Quackenbush, S. (2011): Deterrence theory: where do we stand?, pp. 744-746.
[419] Moreira Kuteev, D. (2019): The Limits of Classic and Perfect Deterrence Theory: A Game-Theory Analysis of the United States-North Korea Nuclear Standoff, Hyperlink: http://yris.yira.org/essays/3344 (Last visit: 01.10.2022).
[420] Selten's 'perfectness' criterion is the key element of PDT and shaped the name of the very theory. For brief description, a sub-game perfect Nash Equilibrium must fulfil the requirements of a Nash-Equilibrium and be the rational choice identified through backward induction under the condition that non-credible threats are discarded. For reference, see the short and generally excellent introduction to game theory, see: Gibbons, R. (1997): An Introduction to Applicable Game Theory, pp. 135 f.
[421] Kim Chong Woo (2020): Implications of Perfect Deterrence Theory for South Korea, pp. 10-12, Hyperlink: https://en.asaninst.org/wp-content/themes/twentythirteen/action/dl.php?id=50362 (Last visit: 17.09.2022).

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1. Since this particular sequential game is based on complete information, the Challenger knows that the Defender would choose denial at node 2, thus leading to a pay-off of 1 in case of war for the Challenger. The status quo however would provide a pay-off of 2 to the Challenger, hence the Challenger will choose cooperation and the status quo is thereby retained. In order for this sequential game 'to work', the Defender must credibly prefer conflict over concession at the second node, which is then known and believed by the Challenger (again under the assumption of complete information and that the Defender has the relevant capabilities required for a conflict, otherwise the threat would not be credible). All these elements are reflected in the pay-off volumes shown below.[422]

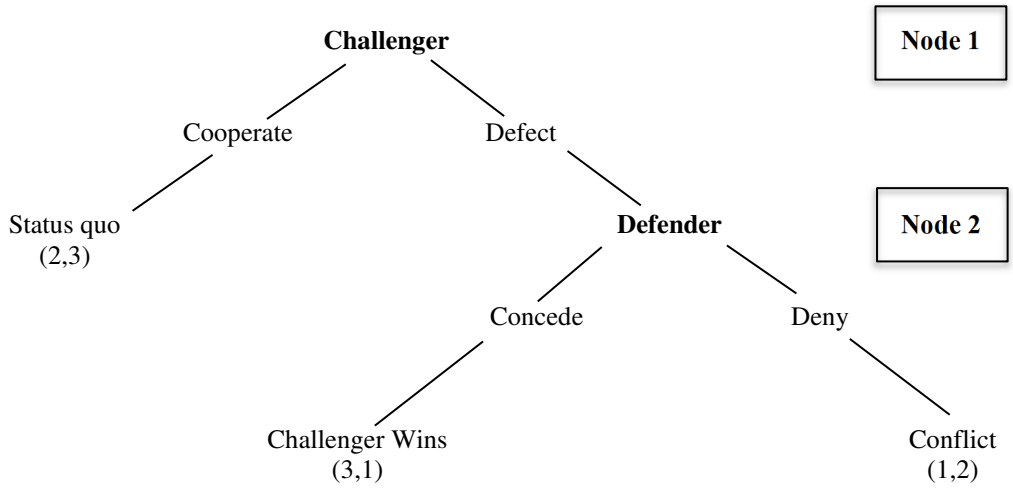

Figure 4: Rudimentary Asymmetric Deterrence Game under credible threat conditions[423]

There are further elements of PDT not yet introduced, such as the more specialised sub-models of the theory, such as the Generalised Mutual Deterrence Game, the Unilateral Deterrence Game, and the Asymmetric Deterrence Game, including the introduction of incomplete information with the subsequent application of Perfect Bayesian Equilibria (PBE)[424], which are not further detailed at this point because of the limited added value in terms of understanding the basic conceptual foundation of PDT as presented in the literature review. However, the sub-model of unilateral deterrence is given further and more comprehensive consideration in Chapter 3 through the creation of a more specialised analytical model for the empirical Chapter

[422] Quackenbush, S. (2011): Deterrence theory: where do we stand?, pp. 746-748.
[423] See the subchapter 'Theories of Deterrence' in: Quackenbush, S./Zagare, F. (2016): Modern Deterrence Theory: Research Trends, Policy Debates, and Methodological Controversies, Hyperlink: https://academic.oup.com/edited-volume/41327/chapter/352325980#oxfordhb-9780199935307-e-39-div1 (Last visit: 09.03.2022).
[424] Gibbons, R. (1997): An Introduction to Applicable Game Theory, pp. 140-147.

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4 of this doctoral thesis.[425] To get a glimpse from the theoretic complexity of PDT, one needs to just compare the comments exchanged between Lawson and Zagare about the question of added-value gained from the theory in comparison to the established classical deterrence theory. In that regard, Lawson forcefully challenged the conceptual and theoretical foundations of PDT.[426] As one of the main proponents of PDT, Zagare firmly repudiated such critique.[427] In this doctoral thesis, PDT is drawn upon as an essential theoretical contribution which is taken into account for framing the models in order to answer the research question.

2.1.6.3 Overview of past empirical research in Perfect Deterrence Theory

This subchapter aims at providing a very brief overview of existing empirical research contributions that make use of PDT.

According to Quackenbush, who undertook a 'stock-taking' of the empirical research in 2011, empirical tests of deterrence theory have largely been conducted through quantitative analyses or case studies, which both provided disadvantages and certain inconclusive results from the testing. The case studies, to which Quackenbush referred, were largely conducted under Cold War conditions and criticising rather than testing rational deterrence theory, which eventually evolved into PDT. From a quantitative analytical perspective, most contributions have concentrated on immediate deterrence cases – rather than the PDT focus on general deterrence – and predominantly tested those hypotheses that the individual authors proposed in their respective works.[428] This represented a particular drawback because general deterrence has to fail first in order to arrive in a case of immediate deterrence, which was apparently not resolved, when Quackenbush performed a follow-up to his empirical studies 'stock-taking' in 2017. Nevertheless, Quackenbush's 2017 assessment of the more recent research contributions highlighted some relevant insights with a view to PDT in particular but also deterrence theory in general. First of all, one of the most active authors that provided continuous research on PDT was Quackenbush himself, but again mainly with quantitative analyses.

In the field of case studies, the most active of the PDT-related authors was Zagare with occasional participation by Kilgour or Quackenbush. The topics surveyed were (1) NATO's failure in deterring Serbia from neither bombing civilians nor conducting massacres aimed at non-Serbian ethnic groups in Kosovo. Another popular topic was the 1914 July crisis that

[425] Zagare, F. (2004): Reconciling rationality with deterrence. A re-examination of the logical foundations of deterrence theory, p. 112 and pp. 116-123.
[426] Lawson, F. (2013): Back to the Future in the Study of Deterrence, pp. 144-153.
[427] Zagare, F. (2013): Deterrence Theory, Then and Now: There is No Going Back, pp. 157-164.
[428] Quackenbush, S. (2011): Deterrence theory: where do we stand?, pp. 754-757; with particular reference, footnote no. 74 on p. 754.

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marked the beginning of World War I. In this analysis, PDT in its three-player framework served as the foundation for the analysis *Entente*'s failure in deterring imperial Germany with its ally Austria-Hungary from going to war. Lastly, the Cuban Missile Crisis was also used as a successful testbed for PDT, wherein Zagare defined asymmetric escalation game that was able to explain both sides' actions and the crisis solution of a compromise (removal of the Soviet missiles from Cuba against removal of U.S. missiles from Turkey).[429]

Shedding at least some light on a sample of post-Cold War era case studies, an example for a mixed immediate deterrence/general deterrence case between two players was undertaken by Chong Woo, who analysed the dyadic conflict between North Korea and South Korea, which applies a rather unsystematic 'theory-to-events matching' approach throughout his study to validate PDT. Despite the peculiarities of this conflict in East Asia that differs quite considerably from the politico-military situation in the Euro-Atlantic region (especially since 1991/1992), Chong Woo's case study still represents a strong supportive example for the practical applicability of the relatively new PDT to empirics.[430]

Sorokin performed a general deterrence case study under incomplete information on the case of the informal U.S.-Israel alliance, wherein he operationalised the theory to fit the test case of Israel 1963-1989 with his specific conditions of that state throughout that period including the conflict-induced breakdowns of general deterrence.[431]

In comparison to the case studies, quantitative analyses often produced more generalisable insights, but their methodological approach of formulating deductive hypotheses on the basis of large n-samples (often with historic data reaching back decades or even centuries) cannot be simply applied to the fixed setting of a case study, which the aim of this dissertation.[432] Nevertheless, important input could be extracted from an investigation of the relevant quantitative literature.

For example, Do Young Lee tested equilibria predictions for 30 cases of contemporary military alliances/defence pacts in regard to conventional/nuclear deterrence postures in conjunction

[429] Quackenbush, S. (2017): Empirical Analyses of Deterrence, pp. 2 f. and pp. 12-14, Hyperlink: https://oxfordre.com/politics/view/10.1093/acrefore/9780190228637.001.0001/acrefore-9780190228637-e-313 (Last visit: 17.01.2023).

[430] For an executive summary of this contribution and the 'pick-and-choose' individual case examples, see: Kim Chong Woo (2020): Implications of Perfect Deterrence Theory for South Korea, pp. 6-9, 16-18, 22-28, 34-36, and 39 f., Hyperlink: https://en.asaninst.org/wp-content/themes/twentythirteen/action/dl.php?id=50362 (Last visit: 29.10.2022).

[431] Sorokin, G. (1994): Alliance Formation and General Deterrence: A Game-Theoretic Model and the Case of Israel, pp. 301-304 and pp. 315-323.

[432] For an example on quantitative research on general deterrence theory, see: Quackenbush, S. (2010): General Deterrence and International Conflict: Testing Perfect Deterrence Theory, pp. 66-69; and as example for extended deterrence, see: Do Young Lee (2021): Strategies of Extended Deterrence: How States Provide the Security Umbrella, pp. 778-780.

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with extended deterrence. This analysis provides important theoretical and methodological input, *inter alia*, such as the application of the informal 3:1 ratio between a successful attacker's quantity of military capabilities versus the defender's quantity, the differentiation between nuclear and conventional defence pact to nuclear and conventional forward deployment, and the use of binary variables for a threat assessment by the alliance/pact of a (potential) attacker.[433] In contrast the other researchers, Do Young Lee's analysis actually offered some insight on the U.S. extended deterrence to NATO-Europe for the period 1992-2014, where the target for deterrence was unclear – i.e., no monolithic military adversary –, subsequently no attacker-to-defender ratio had been available. It is noteworthy that this interpretation of Do Young Lee, namely the period from beginning of the post-Cold War era till the 2014 Russia-Ukraine crisis has so far marked an 'analytical void' for deterrence theory[434], because NATO and Russia did not see each other as adversaries (at least in writing).[435]

Only from 2014 onward, the researcher eventually identified the US-NATO Europe case as highly likely existential threat (at least to the NATO allies in the Baltic) based on a sound *rationale* of the Eastern European allied states that became increasingly afraid of potential Russian politico-military threat to former Soviet territories after the 2014 Russian annexation of Crimea.[436]

There are several examples regarding the application of quantitative analysis method conducted by Quackenbush as one of the key authors of PDT. These encompass the identification of sets of continuous rivalry between a dyad of two states or groups of states with a view to conflicts[437] as well as the test of predictions derived from PDT in regard to general deterrence.[438]

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[433] Do Young Lee (2021): Strategies of Extended Deterrence: How States Provide the Security Umbrella, pp. 771-781.

[434] Do Young Lee delivered only one short paragraph on the issue of the NATO-Russia relationship 1991-2013, wherein he stated that no clear common threat had existed in that timeframe due to the divergence in NATO member states' threat perception and geographical focus of interest. For reference, see: Do Young Lee (2022): Appendix for "Strategies of Extended Deterrence: How States Provide the Security Umbrella", p. 49, Hyperlink: https://dataverse.harvard.edu/api/access/datafile/5740864?gbrecs=true (Last visit: 29.10.2022).

[435] Quote: "NATO and Russia do not consider each other as adversaries." (1997 NATO-Russia Founding Act – Preamble). For reference, see: NATO (1997): Founding Act on Mutual Relations, Cooperation and Security between NATO and the Russian Federation, p. 3. Hyperlink: https://www.nato.int/nrc-website/media/59451/1997_nato_russia_founding_act.pdf (Last visit: 23.10.2022).

[436] Do Young Lee (2022): Appendix for "Strategies of Extended Deterrence: How States Provide the Security Umbrella", p. 2 and pp. 42-53, Hyperlink: https://dataverse.harvard.edu/api/access/datafile/5740864?gbrecs=true (Last visit: 29.10.2022).

[437] Quackenbush, S. (2006): Identifying Opportunity for Conflict: Politically Active Dyads, pp. 40-48.

[438] Quackenbush, S. (2010): General Deterrence and International Conflict: Testing Perfect Deterrence Theory, pp. 64-50.

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Furthermore, the predominant focus of empirical research contributions has been so far on immediate deterrence issues.[439]

Putting the empirical examination of PDT in a nutshell, the case of NATO deterrence and defence in regard to Russia, especially for the timeframe 1992-2014, has not been thoroughly analysed yet and represents therefore a major research gap that this dissertation intends to fill with a reliable theoretic basis on an applicable extension of PDT and a more refined systematic analytical structure. The first step of the endeavour of transforming theory into an operationalised and applicable model for the empirical part of this doctoral thesis is the identification of the general parameters under which the states as unitary actors pursue military security in the Euro-Atlantic region.

2.5 Summary of the literature review and identification of the research gap

This literature review chapter aimed at providing a brief introduction to concepts and theories deemed relevant for the purpose of answering the research question of this dissertation. Furthermore, based on the literature review, an appropriate theoretical approach is to be identified which is further explored and extended in the scope of Chapter 3.

In the initial subchapter 2.1.1, the conceptual foundations have been laid out in comprehensive detail. The key actors under scrutiny were presented to be unitary and rational nation-states, whose key national goal has been defined as acquiring military security inside an anarchic international system. These states have specific and unique properties, such as population number, territorial size, geographic location, economic wealth and more, which they try to protect against any state with aggressive (and/or greedy) intentions. The political goal of military security is thereby interpretated as the state pursuing a two-pronged strategy: (1) increasing its own capabilities in order to deter any aggressive state from realising its intentions by military means, and (2) punishing any aggressive state that decided to realise its intentions by force against one's own state. In this doctoral thesis, it is generally assumed that the states under particular examination – the member states of NATO – do primarily exhibit a desire to retain the *status quo* in regard to deterrence and defence, even though third states might perceive it differently. Lastly, the international system has been described as anarchic (foreshadowing the later IR theories that rest on this axiom), because there is no central worldwide authority above the state community. However, the international system is not without structure, since

[439] For a brief overview on the quantitative research, see: Huth, P. (1999): Deterrence and International Conflict: Empirical Findings and Theoretical Debates, p. 35.

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the collection of the more or less formal and informal relations between two or more states, including the establishment of various cooperation formats, led to the creation of so-called (regional) security architectures. In view of this dissertation's focus, the Euro-Atlantic region is hereby of obvious primary interest.

Thereafter, the further conceptual subchapters 2.1.2 and 2.1.3 continued with a more in-depth description of two decisive elements of military security: (1) Deterrence was presented a complex and multi-layered concept that covers policy reactions to concrete short-term threats as well as long-term abstract potential challenges. Since 1945, deterrence as a concept has predominantly been influenced by the invention and spread of nuclear weapons. At latest after the second superpower the Soviet Union got hold of them, deterrence began to move to from a pure military weapon to a tool of politico-military pressure by those that own them against those that do not and between nuclear-weapon states. The notion on defensive measures, i.e. the SDI programme of the 1980s for protecting the continental U.S. against a Soviet nuclear first strike has already been touched under deterrence, but did not play a further role in the Cold War, especially because the Soviet Union crumbled in late 1991. The issue of ballistic missile defence has remained and became even more influential in the post-Cold War era, which is more thoroughly addressed in Chapters 3 and 4.

The relationship between deterrence and defence could be best described as 'separate but linked', because they both rely on military capabilities as 'building materiel'. In regard to the further aspects of military capabilities, a distinction between nuclear capabilities and conventional ones must obviously be made. Whereas the challenge of nuclear weapons has already been mentioned under deterrence, conventional deterrence was covered more thoroughly in the subchapter on defence, because conventional weapons might be expected to see first and most widely-spread use in an actual symmetric war, even though such a war between nuclear weapons might have the potential to escalate into 'unforeseeable proportions' (under the assumption that NATO's flexible response doctrine still holds and no third state would initiate a war with a nuclear first strike, i.e. a first mover maximum escalation strategy). In the case of conventional defence, issues like force thinning encompassing the spread of scarce military formations across a long defence parameter, would represent a challenge and should therefore be at least from an analytical perspective highly relevant for NATO's conventional deterrence and defence posture; again, another aspect to be further kept in mind in the next chapters.

Following the three conceptual subchapters, two intermediate subchapters 2.2.1 and 2.2.2 were added to bring a broader perspective on the topic of multilateral defence cooperation. Based on

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conditions of the international system as well as the individual state's parameters, the unitary national defence, security and foreign policy decision-maker might arrive at the conclusion that pursuing an insular optimisation policy of national military capabilities might neither be adequate to meet the national demand for military security (because other states have more resources at hand), nor resource-efficient (after all, military capabilities do need considerable investments in terms of financial, material, and human resources; this is addressed through public goods theory), the state could want to engage in one or more cooperation format with another state or group of states. Thus, the typologies for defence cooperation chapter of provided a brief overview of the more formalised and empirically observed defence cooperation formats, including a focus on the archetypical 'military alliance'. The two further subchapters refined insight on military alliances by introducing the empirically founded particular structures of NATO, such as the unanimous decision-making, the key role of the U.S. for the alliance's member states, and the post-Cold War era changes that NATO underwent in their relationship to third states with the particular example of the institutionalisation of NATO-Russia relations. In subchapter 2.3, tthe literature review moved then onward to two major theoretical schools of the IR discipline, namely the two rational choice-oriented 'grand theories' of Neorealism and Neoinstitutionalism. Both schools share the basic tenets, such as the state as unitary actor and the anarchic international system. However, both differ in their expectation regarding the behaviour and policy choices of states with a view to their national objective of increasing military security under the problematic conditions of the international system. Under Neorealism, states tend to pursue a balance of power strategy, wherein like-minded states that consider a certain state as joint threat that no individual state can face alone.

The incentive to create an alliance with the aim of countering the common threat might only hold, until the threat disappears. From the outside of an alliance, a third state that threatens individual alliance member states could pursue a wedge strategy, introduced in subchapter 2.4.5, wherein he tries split the allied players from each other in order to weaken or break the alliance. There are incentives for states to evade costs of an alliance, and since states are deemed egotistical, alliance members must face the constant fear of the ally's defection from the alliance. Meanwhile, Neoinstitutionalism provides comprehensive insight into the stability of alliances even beyond their original purpose (which would be the threat from the Soviet Union and the Warsaw Pact in NATO's case). The institutionalised cooperation framework of the transatlantic alliances enables states to retain politico-military trust by transparency and military cooperation amongst themselves, retention of military strength through joint training or standardisation of equipment, and general deterrence at the political level in case that an abstract

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threat – maybe as a result from the instability of the international system of the post-Cold War era – manifest in the future. Furthermore, the benefits of the military alliance set an incentive for states to further intensify their cooperation inside an alliance up to the point where states become interdependent on each other's cooperation. This in turn makes a defection cost-intensive and therefore less preferable than Neorealism would expect. Both IR theories have their advantages and setbacks, but provide valuable input, since they are based on the same conditions of the international system but give different interpretations about the same occurrences from a system-theoretical perspective.

Considerably different from the all-comprehensive self-image that the 'grand theories' of IR theory offer, Defence Economics appears to be a rather neglected scientific niche in comparison, because it crosses the boundaries from political science/international relations over public economics and further into the rather exotic academic field of military studies (and in which Anglo-Saxon universities seem to be overly represented). In order to move Defence Economics and its related theoretical approaches – that are relevant to the research question of this dissertation – into the limelight, the last subchapters were attributed around half of the total space of the literature review.

With the foundations laid in the conceptual subchapter on the state and the international system, military security is interpreted as a public good and further examined along the lines of public goods theory. It is important to distinguish the level of analysis in order to adequately address military security, since its interpretation as pure or impure public good depends on the position of the viewer. For example, nuclear deterrence in NATO can be considered a pure public good, because the U.S. takes care of that task for the transatlantic alliance for all. Any new member would neither change the amount of deterrence used by the alliance nor the cost of nuclear deterrence. Alternatively, the number of national military formations that each NATO ally maintains, is limited due to resource constraints. In case of a potential NATO operation, e.g. for alliance defence or crisis management, each state decides on his own how much they want to commit to that task (possibly in expense of national operations; the single set of forces applies). This leads directly to subchapters on resource allocation theory and the Economic Theory of Alliances that address the national allocation of resource towards military capabilities and the distributive effects between allies of a military alliance. The allocation is set at the national level, whereon a unitary national decision-maker identifies its demand for the public good military security versus other non-military-related public goods (the 'Guns versus Butter' challenge). Depending on the national priority attributed to military security, the specific amount of defence expenditure and related variables, such as number of military personnel, as

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well as numbers of different weapon types, are set. Membership of a state in a military alliance might hereby serve as a 'transmission belt' for increasing or decreasing national investments. In the original theory of Olson and Zeckhauser, it is assumed that smaller states tend to free-ride to the disadvantage of larger and more powerful states, which then need to carry a relatively larger share of the defence burden of the alliance. As already explained in the specific subchapter, the economic theory of alliances provides a relatively limited output, because it is so much focussed on the identification of a fair burden-sharing. It is still useful in understanding intra-alliance bargaining dynamics.In regard to the alliance-third state interaction, the arms race theory is an almost classical approach, because it very much reflects the relationship of an orthodox military alliance facing one or more non-member states. Strongly influenced by Richardson's two-states arms race model, the theory is marked by the dichotomous relationship of two or more states. With the end of the Soviet Union and the dissolution of the Warsaw Pact, the major bloc arms race quickly ended as well. Instead, it became clear that the formerly large stockpiles of military capabilities were apparently not required for a post-Cold War era setting and a disarmament spiral began to start. It is quite astonishing that few long-term perspective research has been invested in this domain, except case studies on arms control on conventional and nuclear weapons of course. This doctoral thesis therefore focusses one part of the upcoming Chapter 3 and 4 on the exploration of the conventional reductions in NATO's military capabilities for the full time period 1992-2016.

Moving from the concrete arms races to a more abstract level, all interaction between states could be formulated as bargaining problems, thus it was just logical to add subchapter 2.4.5 dedicated to bargaining theory. While this research domain is vast and many different models exist, the 'Bargaining Model of War' received particular attention. The model focusses on probabilities for peaceful settlements between to opposite states under the shadow of conflict, thereby exploring the threshold where a state might choose a war over bargaining due to the better relative pay-off. From an empirical perspective, it can axiomatically be stated that all decisions of NATO between 1992-2016 were in the bargaining range for the third state Russia due to the absence of any symmetric war between the two powers in that timeframe; notwithstanding any potential NATO or Russian displeasure with the other's political actions.

The last subchapter provides the foundations of deterrence theory, namely the three variants of 'Game of Chicken' as groundwork, classical deterrence theory as the collection of established literature body and the more recent 2010s perfect deterrence theory as inspiring fresh approach. All three variants support the understanding, how a rational state choose their specific policy strategies for deterring aggressive state. As important subset of deterrence theory, the research

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contributions on nuclear deterrence have long played a dominant role in the theory and empirical reality of the Cold War, but lost considerable traction following the dissolution of the Eastern bloc. Further arms control and prevention of the proliferation of weapons of mass destruction seemed to be the 'challenge of the day' in the post-Cold War era. It is surprising that the containment of symmetric nuclear war had disappeared as a topic on politician's agenda so quickly, especially since U.S. technological progress leading to the deployment of modern non-nuclear area ballistic missile systems. The introduction of a NATO ballistic missile defence programme was described as protection against few ballistic missiles launched by rogue states against NATO's European member states; an argument that was staunchly rejected by Russia. Since the 2014 Russian annexation of Crimea, the issue of nuclear deterrence became growingly important and the 2019 U.S. withdrawal from the INF Treaty in response to an accused Russian violation by developing and deploying land-based cruise missiles, the interaction between NATO and the U.S on one side with Russia in relation to advances in nuclear deterrence and ballistic missile defence have not received much warranted attention. The following Chapter 3 and 4 are intended to change that knowledge gap.

But despite that the *raison d'etre* for NATO had disappeared, the transatlantic alliance managed to thrive in a world without a monolithic symmetric military threat to its member states. Many researchers conducted comprehensive examinations of the apparent survivability of NATO as a politico-military international organisation[440] since the early 1990s, while few have actually posed the question what amount of defence capabilities NATO needed in a world absent of a symmetric military threat[441], which the Warsaw Pact had been for central Europe[442] with the Soviet Union as its main proponent[443]. With a missing threat bringing allies together to join forces, what should the key point of planning military forces both quantitatively and qualitatively then be? – From the wealth of research literature presented in chapter 2.3, the two traditional 'grand theories' of IR appeared to offer the most robust response, because both generally aim at providing most comprehensive answers about national behaviour in the international system, including multilateral defence cooperation. Also shown in the subchapter

[440] See for example: McCalla, R. (1996): NATO's persistence after the Cold War, pp. 448-469; Duffield, J. (1995): NATO's Functions after the Cold War, pp. 764-778; or Lepgold, J. (1998): NATO's Post-Cold War Collective Action Problem, pp. 80-85.

[441] It is surely debatable, if the Soviet Union and the Warsaw Pact had been the mainstay of national defence planning for all NATO allies at the time of the Cold War or if individual allies were keener to plan for eventualities in regard to specific challengers to their own national ambition. For a classical reference, see the Greece-Turkey military tensions since the 1960s, in: Kollias, C. (1996): The Greek-Turkish Conflict and Greek Military Expenditure 1960-92, pp. 217-225.

[442] Posen, B. (1985): Measuring the European Conventional Balance: Coping with Complexity in Threat Assessment, pp. 47-54.

[443] Brzezinski, Z. (1984): The Soviet Union: World Power of a New Type, pp. 147-159.

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on international relations theories, both theories were quick in revising their own tenets in order to legitimise their existence for the research community. Regardless of these theory-focussed considerations, when it comes to explaining actual quantities of military capabilities in military alliance's member states, the IR theories lack the required level of granularity to determine, why armed forces have the size they have.

In comparison, Defence Economics provides a relatively recent but growing study programme that applies economic theory to detailed defence-related questions. As shown in the respective subchapters 2.4, states do individually determine their required level of military security and then set the quantity of military capabilities needed. Threats are an important factor in that national decision-making process, particular when it comes to identifying the military capabilities required to deter and defend against that threat. When the states under scrutiny are members of a formal military alliance, which is not based on a joint threat perception (anymore), a competition over scarce resources of the alliance (which may have existed previously and might grow in ferocity) ensues, since each states wants to have the alliance prioritising its nationally determined threat. The processes described – national resource allocation and alliance burden distribution – can withstand a higher degree of imprecision when it comes to the specific type of threat. For example, a shift from a symmetric to an asymmetric threat might lead to an adjustment in defence expenditure volumes as well as an adaption of the defence capabilities development of an alliance in order tackle the 'new problem' (e.g., from Soviet aggression to Islamist terrorism). States might also be able to agree on a complementary share of the defence capabilities required for tackling the diverse threat types.

Other theoretical approaches introduced under Defence Economics, however, struggle more intensively with the prospect of a military alliance without a peer competitor. This concerned especially arms races theory, the bargaining model of war, and deterrence theory, because each one relies on a 'competing player', without which they cannot operate.[444] As a work-around to this issue and in this as well as the following subchapters, the Soviet Union's primary successor state Russia is taken as general opposing player. This could be considered anachronistic due to the fact that Russia did not continuously act as NATO's rival in the time frame under examination; sometimes even cooperating with NATO through various channels. Nevertheless, the creation of a game model based on certain ahistorical generalised rivalry assumption

[444] Without a model based on a state-dyad, game theory cannot be applied, because the pay-offs of each strategy choice of one state are dependent on the strategy choice of the other. Omitting a second player would eventually lead to the question, if decision theory would not be better suited for such an analysis. See: Ormerod, RJ (2010): OR as rational choice: a decision and game theory perspective, pp. 1763 f.; or: van Binsbergen, J./Marx, L. (2007): Exploring Relations Between Decision Analysis and Game Theory, pp. 1 f., Hyperlink: Hyperlink: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=957636 (Last visit: 23.09.2022).

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between NATO and Russia (1) permits the application of game theory as the theoretical core for an analytical framework in order to examine the alliance's deterrence and defence posture against a third-state challenger, such as Russia (i.e., this also means the model is flexible and Russia could easily be exchanged with any other third state), (2) is a completely legitimate approach from a IR theoretical perspective[445], and (3) corresponds with the continuity of Russian strategic military thinking from the Cold War to post-Cold War era[446].

Furthermore, the majority of the classical research on nuclear and conventional deterrence[447] in the scope of deterrence theory dates back to the 1980s, when NATO was facing the military threat of the Warsaw Pact. The theoretic evolution of the deterrence theory discipline was, *inter alia*, pushed by three researchers – Zagare, Kilgour, and Quackenbush – that developed Perfect Deterrence Theory that introduced incomplete information conditions and (Perfect) Bayesian equilibria outcomes to the discipline.[448]

As a result of the thorough examination of the different theoretical approaches presented in the subchapter 2.3 and 2.4, the newest deterrence-related approach of Perfect Deterrence Theory that was introduced in subchapter 2.4.6.2 was selected as the foundation for the further exploration and development of the game-theoretic framework in the scope of Chapter 2 of this dissertation. In regard to the research gap, following elements have been discovered:

Basic research: The question of a new or re-development of a neglected research ara (conventional and nuclear deterrence) on the basis of new theoretical approaches and methods is required in view to politico-military changes since the 2022 Russian attack on Ukraine.

Case study contribution: The question of the credibility and capability of NATO's deterrence and defence posture from an empirical perspective for the years 1992-2016 can be answered using the theoretical approach.

Operationalisation: Previous PDT models were tested either on the basis of quantitative analyses or based on case studies. Currently, no case studies cover the field of this dissertation's interest. In this respect, an additional research contribution to the transfer from PDT to practical application is another research gap.

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[445] Lawson, G. (2010): The eternal divide? History and International Relations, pp. 206-210.

[446] Covington, S. (2016): The Culture of Strategic Thought Behind Russia's Modern Approaches to Warfare, pp. 21-46, Hyperlink: https://www.belfercenter.org/sites/default/files/files/publication/Culture%20of%20Strategic%20Thought%203.pdf (Last visit: 23.09.2022).

[447] See, e.g., Mearsheimer, J. (1983): Conventional Deterrence; or: Huntington, S. (1984): Conventional Deterrence and Conventional Retaliation in Europe.

[448] After all, Kilgour's and Zagare's Perfect Deterrence Theory as a critique to the classical Cold War deterrence theoretical approached was just published in 2009, see: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory.

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Chapter 3: Proposal for an integrated game-theoretic framework based on Perfect Deterrence Theory

Chapter 3 consists of five subchapters: The initial subchapter 3.1 provides a more detailed introduction to the conceptual foundations of the players' behaviour in a game of Perfect Deterrence Theory (PDT)[449] under incomplete information. Then, subchapter 3.2 establishes the definition of the game parameters, upon which the particular game model of this dissertation rests. The game model itself is subsequently developed throughout the subchapter 3.3 in two partial games, which are seamlessly integrated into a game model that is likewise further extended in subchapter 3.4. Lastly, subchapter 3.5 revisits the research question of this dissertation from a PDT point of view in order to deduce a hypothesis about the players' decisions in regard to a military alliance's deterrence and defence posture without a monolithic adversary.

3.1 Introduction

On the basis of a selective cross-section of the existing theoretical literature as presented in the subchapters 2.3 and 2.4, Perfect Deterrence Theory (PDT) – developed by Zagare, Kilgour, and Quackenbush and briefly introduced in subchapter 2.4.6 – was selected as the most promising theoretic approach for answering the research question of this dissertation. This Chapter 3 now provides a more in depth-review of the different parts of a PDT game model, such as the players' characteristics, game structure, game parameters, and most importantly, game play. If a pun is allowed at this point, then PDT is indeed perfect for the case-study focussed empirical analysis in Chapter 4 because this work strand based on a game-theoretic approach offers certain flexibility:

> "[…] [G]ame-theoretic models are, in essence, empty vessels: they can be filled with a wide variety of substantive liquids. And while the liquids largely take on the shape of their containers, they remain liquids: fluid and malleable." (Zagare/Kilgour)[450]

As a first starting point for the more in-depth review, which includes a recombination of different parts of PDT into an integrated game, it might be useful to shortly recall the central motivation of states in regard to their national military posture. Considering the principal fact

[449] The theory was comprehensively introduced in the following book: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory.
[450] The reference was made by: Langlois, J.-P./Langlois, C. (2005): Fully Informed and on the Road to Ruin: The Perfect Failure of Asymmetric Deterrence, p. 504; and the quote comes from: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 71.

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that a state does not exist not alone in the international system, but is one among many, each state wants to acquire a nationally determined level of 'military security', which is understood as seeking

> "[…] the ability […] to defend [itself against] and/or deter military aggression." (Szpyra)[451]

At a first glance, the pursuit of military security could be circular for a state because the 'ends and means'[452] seem identical in that above definition, i.e., states pursue military security by increasing investments into military capabilities used for deterrence and defence purposes. Then, by investing in these military capabilities, they increase their military security.

On a second thought, however, the behaviour of states in regard to the pursuit of military security might not be circular after all, because the state might want to sustain beneficial conditions that the state has established for itself. Examples for such conditions besides the assurance of its national survival is the preservation of internal freedom and self-determination[453] or simply the protection of its national tax base[454] from harm.

In divergence from Szpyra's definition of military security, there are states that might not see deterrence and defence as the core of their own military security. There are many empirical examples of states that employ aggressive intentions towards other states throughout world history; either due to ideological differences, e.g., the perception of being a great power with subsequent rights that other states do not possess, or due to greed because other states have more resources that could be extracted by the aggressive state through military force.

Therefore, and in a nutshell, two categories of states are hereby defined: (1) States that pursue a military capability used for deterrence and defence, which are assumed to be protective of a *status quo*[455], and (2) aggressive, revisionist or revanchist[456] states that pursue or own military

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[451] Szpyra, R. (2014): Military Security within the Framework of Security Studies: Research Results, p. 65.

[452] For a critical examination of the 'ends-ways-means' methodology, which is quite popular in military studies, see: King, I. (2020): Beyond Ends, Ways, and Means: We Need a Better Strategic Framework to Win in an Era of Great Power Competition, Hyperlink: https://mwi.usma.edu/beyond-ends-ways-and-means-we-need-a-better-strategic-framework-to-win-in-an-era-of-great-power-competition/ (Last visit: 25.09.2022).

[453] Szpyra, R. (2014): Military Security within the Framework of Security Studies: Research Results, pp. 60-71.

[454] Holcombe, R. (2008): Why Does Government Produce National Defense?, pp. 11-18.

[455] The *status quo* is understood as the state of affairs, wherein no aggressive states issues military threats to change the distribution of physical and non-physical resources between any state or states in the international system. It should be stressed, particularly in light of military alliances, that the change in the distribution of resources could also occur through the creation, enlargement or dissolution of alliances for both offensive and defence purposes (this would account for, among other things, the impact from dissolution of the Warsaw Pact or the enlargement of NATO).

[456] The attributes 'aggressive', 'revisionist' and 'revanchist' are put into order of aggressiveness. The different terms shall be following the following rough interpretation: An aggressive state considers military force as a principally legitimate tool for change the *status quo*, a revisionist state conducts threats against other states to overcome the *status quo*, and a revanchist state executes a military threat to actively change the *status quo* by the use of military force.

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capabilities used for threatening and/or executing military aggression against other aggressive and non-aggressive state in order to pursue national goals.

In response to the second category of states, military alliances are formed by states that are most likely belonging to the first category. Considering that numerous expressions, in which military alliances have appeared throughout history and whereof a few examples were given in subchapter 2.2, the conditions what constitutes a military alliance in the scope of Chapter 3 receive some restriction.

A military alliance is henceforth understood as a formalised, defensive military organisation that consists of two or more sovereign member states, wherein at least one has access to nuclear weapons in contrast to conventional weapons. As a consequence of the technological requirement, the full analytical framework as provided in subchapters 3.2 to 3.6 is only applicable to military alliances that (1) exist since the first drop of an atomic bomb by a country on another country (August 1945) and (2) have at least one member from the group of known nuclear weapon states (U.S., Russia, UK, France, China, India, Pakistan, North Korea, and Israel; as of January 2022).[457] After the presentation of these restrictions at this point, subchapter 3.2 presents the core tents of PDT including its implications for the game-theoretic framework that is developed throughout Chapter 3.

3.2 The conceptual foundations of credibility, capability, and rationality

As highlighted in the introduction to Chapter 3, one of the reasons for military alliances to be formed is the existence of aggressive, revisionist or even revanchist states, which threaten other states in order to gain further military security.

As a consequence, those states that do not pursue an aggressive foreign and military policy on their own must prepare their own armed forces in order to deter any potential adversary from attack. The responsibility of a state towards protecting its territory and population from outside harm can only be successful, if the national decision-makers heed a basic principle that was already spelled out in antique times: "*Si vis pacem, para bellum*" (Publius Flavius Vegetius Renatus; *known as* Vegetius).[458]

[457] ACA (2022): Nuclear Weapons: Who Has What at a Glance, Hyperlink: https://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat (Last visit: 11.01.2023).

[458] Translation of the Latin phrase: "If you want peace, prepare for war". For reference, see: Amell, A. (2017): The Theory of Just War and International Law, pp. 64-66; For a critical examination of the 'para bellum' hypothesis for the late Cold War, compare: Wallace, M. (1981): Old Nails in New Coffins: The Para Bellum Hypothesis Revisited, pp. 91-95; and for further references, see: Garthoff, R. (1992): Why Did the Cold War

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From a PDT point of view, it must now be asked what is required by a state to be prepared for war? – First, national decision-making is assumed to follow an instrumental rationality, whereby a state chooses such a policy strategy that leads to the nationally determined most preferred outcome; in this case the sufficient level of defence expenditures and subsequently military capabilities purchased with them to reach a commensurate amount of military security. In a game with incomplete information, the national preferences are set based on the private information that a state owns about itself (e.g. the strength of his political will and of his national capabilities) as well as his beliefs about the other player (e.g. the politico-military posture of an adversary).[459]

The behaviour of states in a game-theoretic approach as the one pursued in PDT is explained by a *trias* of three interlinked but separate concepts that should herewith be introduced in some more detail. The conceptual parts are: (1) Credibility, (2) Capability, and (3) Rationality. The first two parts can be explained with concrete game-theoretic examples.

Let us assume that one player, which has taken the role of the conventionally and nuclear-armed challenger[460], issues a threat to militarily attack against either a conventionally and nuclear-armed defender or conventionally armed protégé, which have both formed a military alliance. The challenged defender and/or protégé could defy the threat, but such action requires credibility in order to be taken seriously by the challenger; otherwise, the challenger would simply execute the threat and attack. On the other side, the challenger must also ensure that his threat is credible, or otherwise, the threatened player(s) might not react at all, because the targets believe that the challenger cannot execute the threat anyway.[461]

The issue of credibility in the context of a more complex setting that include military alliances should not be underestimated, because the revisionist state might calculate that a defender would not rush to support the protégé in defying the threat. This belief be the case for challengers, which perceive the defender's interest in the protégé itself or its geopolitical region of his ally is only minor. Hence, the credibility of the defender in deterring a revisionist challenger would be perceived as low by the challenger. Such a setup could incentivise the revisionist challenger to test the alliance between protégé and defender in order to adjust the *status quo* into a more favourable direction. Likewise, if the defender has a formalised alliance with the protégé and does furthermore back up that alliance through signalling based on military

Arise, and Why Did It End?, pp. 281-291; and: Roland, A. (2010): Was the Nuclear Arms Race Deterministic?, pp. 445-448 and pp. 455-461.

[459] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 39-44.

[460] A challenger is a conventionally and nuclear-armed third state. The details of his role are described in remainder of Chapter 3.

[461] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 66-70 and pp. 87-93.

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capabilities, e.g., by regular joint military exercises with the protégé or show of force through military deployments in the region of the protégé, the defender's credibility is high.[462] In a nutshell, every action and reaction by any player in the game must be credible in order the have an effect. However, credibility does not exist without a material context.

As the second part of the *trias*, military capabilities serve as a "a necessary but not sufficient" key requirement (Zagare/Kilgour) for a deterrent to become credible. The concept is applicable to any player regardless of his role, because the challenger requires capabilities to issue credible threats and the military alliance needs them for credibly defying those threats. If a deterrent is not backed-up by the adequate physical, the deterrence is doomed to fail and the challenger might attack, as examples in history have shown[463]. It is difficult to determine, at which point a threat or deterrence is capable. A simple benchmark for the measurement of military capabilities is the usage of simple quantities in terms of defence expenditures, military personnel, and military equipment, because quantities reflect military potential, when deterrence might fail and defence is required from the national and/or allied armed forces.[464]

The last part of the *trias*, rationality is what governs the behaviour of states in PDT, which represents more of a meta-theoretical or strategic aspect of the game rather than a clear-cut empirical or tactical question that can be directly observed at a specific point in the game.

In Zagare's and Kilgour's seminal work on PDT, they distinguished the theoretical difference between the concepts of instrumental rationality and procedural rationality. The later form of rationality has considerable weaknesses because it includes the valuation of all possible outcomes in consequence of a player's decision in order to determine, which action the player chooses to pursue. The two others criticize that psychological stress, especially in crises situations and misperceptions about one self, even though the player has the private information about himself, would be ignored under that form of rationality.

In contrast, instrumental rationality puts the player into an easier position, because he just needs to be able to comply with the criterions of completeness and transitivity. Simply put, an instrumental rational actor must be able to compare two outcomes that are the result of his policy actions and must attribute a preference to each of them; he could prefer outcome a over outcome b, vice versa, or be merely indifferent between the two outcomes (completeness). Furthermore, if he has three or more outcomes from his policy choices available, his order of preferences must reflect a hierarchical logic, i.e., when outcome a is preferred over outcome b,

[462] Danilovic, V. (2001): The Sources of Threat Credibility in Extended Deterrence, pp. 343-349.
[463] In view of the events of February 2022, the Russian invasion of Ukraine could be taken as a prominent example, which Ukraine was not able to deter from occurring.
[464] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 81-84.

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and outcome b over outcome c, then outcome a must automatically be preferred over outcome c as well (transitivity).[465] This order of preferences is going to play an important role in the determination, which of the game's outcomes is preferable for any individual player. If the player has determined the most preferred result of the game, one can be sure that the player makes his policy decisions in that direction that brings him closest to this preferred outcome.

3.3 Definition of an extended general unilateral conventional/nuclear deterrence game

Following the establishment of the fundamental conditions in terms of credibility, capability, and rationality that are valid every player in all games under PDT, the specific game design requires some additional set of defined criteria in order to determine, what setup best reflects the issue of a defensive military alliance's deterrence and defence posture that is challenged by a potentially aggressive third state with the intention of the *status quo*.

Derived from the collection of PDT's various theoretic-conceptual designs, the sum of all elements pertaining to a contemporary defensive military alliance's deterrence and defence posture can be translated into a game mode of 'extended general unilateral conventional and nuclear deterrence'. and this subchapter explains, what each of these terms actually and how they are approached in a game of PDT.

Extended deterrence: First of all, 'extended deterrence' is best described as the interaction between the member states of a military alliance with a view to a third state threatening military action against one or more of the allied member states with the intention of revising the *status quo*.[466] This represents a divergent approach from the traditional deterrence models, which foresee interaction between only two states.[467] In that sense, models related to extended deterrence require obviously a different setup, which had been touched upon in the previous subchapter: In a PDT game, there are the roles of challenger, the role of the protégé that is ideally the target of the challenger's threat in this example , and a defender that is allied with the protégé. As a natural pre-condition of this setup, the defender, which should come to the aid

[465] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 38-44.
[466] Lee, Y. D. (2021): Strategies of Extended Deterrence: How States Provide the Security Umbrella, pp. 761-764.
[467] In accordance with Huth, there are four different forms of deterrence: The one's omitted in this dissertation are (1) direct-immediate (state-to-state short-term military attack deterrence), (2) direct-general (one state pursuing longer-term deterrence policies in order to prevent attacks and crises from occurring altogether), as well as (3) extended-immediate (at least two states deterring a short-term attack). See: Huth, P. (1999): Deterrence and International Conflict: Empirical Findings and Theoretical Debates, pp. 25-28.

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of the protégé, must obviously have some form of national interest in doing so. There is empirical proof that a formal alliance between defender and protégé is not required. However, a formal agreement, such as Article 5 of the NATO treaty certainly helps in ensuring (1) trust between the allied states when military support is required for deterring a challenger, and (2) a strong signal towards challenger with potential revisionist intentions regarding the *status quo* to the detriment of the protégé but who has not yet decided to issue a threat.

In order to briefly describe a simple extended deterrence game, the following example should suffice: A challenger begins its first aggressive move by deploying conventional forces close to the territory of the protégé and openly threatening invasion. The defender needs then to decide to either (1) do nothing, (2) respond reciprocally e.g., by sending own troops to support the protégé's armed forces as signal, or (3) escalate the conflict against the challenger, e.g. by pre-emptively striking the challenger's forces before they can engage in hostilities on the protégé's territory. Such a model design is very elegant due to its simplicity on the one hand, and on the other it had been very influential in Western strategic thinking particularly with the view to NATO-Warsaw Pact/Soviet Union relationship in the Cold War era.[468]

From a theoretic perspective, traditional deterrence theory has modelled extended deterrence on the basis of a two-player model, thereby restricting themselves to the challenger[469] and the defender, while the protégé has been attributed as literally the 'pawn' or 'target', i.e. a passive entity or object that does not directly interfere as active player in the game.

Deviating from this approach, Quackenbush has made a seminal contribution in the field of PDT by providing the first real three-player model of sequential interaction in deterrence, which reflects the dynamics of inter-state relations in terms of alliance mutual support in terms of crises as well as continuous 'umbrella of protection' against external threats.[470] In this sense, this doctoral thesis draws heavily on Quackenbush's 'three-party extended deterrence game', *albeit*, with some modifications. These changes to the base model of Quackenbush are requires, because the original (1) model is focussed on extended immediate deterrence instead of extended general deterrence, and (2) does not yet contain policy option to choose escalation, which is of great importance especially when nuclear weapons are taken into account of the deterrence game[471]

[468] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 169-175.
[469] In this doctoral thesis, the terms 'attacker' and 'challenger' are used interchangeably.
[470] Quackenbush, S. (2011): Deterrence theory: where do we stand?, pp. 757-759.
[471] For reference, see: Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, pp. 562-569 and pp. 573-578.

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General deterrence: In line with Mazarr's typology of the different forms of deterrence, as presented in the beginning of subchapter 2.1.2, deterrence can either be immediate or general. The decisive factor that defines the difference between this dichotomy derives from the period of time, in which a specific deterrence relationship between challenger and defender (or protégé) is observed. If there is a concrete crisis that enfolds or has already been going on for some time (e.g., the 1914 July crisis, the 1962 Cuban Missile Crises, etc.), the defender, protégé and challenger find themselves in a immediate deterrence situation. The attention of researchers has, unfortunately, mostly focussed on deterrence success and failure in crises, whereas both theoretic and empirical analysis of general deterrence has not seen much attention in accordance with Huth.[472]

However, Quackenbush argues that general deterrence represents a much more common situation in the international system than immediate deterrence cases, because states pursue military security as a general foreign, security and defence policy all the time throughout their existence; and the national or world history is more than an infinite series of individual crises and conflicts in a row. The fundamental positive value of general deterrence for its proponents in the international system is, that if it succeeds, the defender and/or protégé can suffocate any crisis and conflict before it occurs, because the challenger would not have any incentive to issue a threat.[473]

There are several ways how general deterrence can be implemented by the defender and protégé. For example, the defender and protégé could use a cooperative security framework in order to bargain with the challenger about a mutually acceptable change of the *status quo* under the shadow of conflict according to Fearon's bargaining model of war, which has been introduced in subchapter 2.4.5.

In case that such approach fails, which a rational defender and protégé must calculate with, both players can still heed *Vegetius*' warning to be 'prepared for war' and prepare an adequate, i.e. credible and capable, deterrence and defence posture in order to dissuade a challenger from issuing a threat despite the non-cooperation through a cooperative security framework.

Considering that this element of the game provides empirical difficulties in regard to its operationalisation; after all, there is no distinct geographically or thematically fixed inter-state tension or crisis attached to it, but rather the general politico-military 'background noise', in which states formulate their national policies and alliances negotiate their alliance policies. A

[472] Huth, P. (1999): Deterrence and International Conflict: Empirical Findings and Theoretical Debates, p. 27.
[473] Quackenbush, S. (2011): Deterrence theory: where do we stand?, pp. 752-754.

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positive aspect is that general deterrence can be examined at any time outside a concrete conflict between any reasonable constellation of players.[474]

Unilateral deterrence: So far, the roles between a defensive military alliance, consisting of a defender and protégé, and a third state challenger were clearly separated: One side intends to keep the *status quo*, while the other is the aggressor that wants to change it through the issuance of a politico-military threat against the alliance. For the military alliance, the main task would subsequently be to deter the challenger from issuing that threat, hence, we talk about a case of unilateral deterrence. This is in contrast to mutual deterrence, which would include cases where the military alliance has intentions on changing the *status quo* to the detriment of the third state, thus both sides wish to prevent the issuance of a threat from the other side.

It is important to point out that military alliance-to-third state relations, such as the one empirically observed between NATO and Russia, are often theoretically examined on the basis of mutual deterrence.[475]

This dissertation takes another course of action and applies 'unilateral deterrence' on the basis of the following arguments: Given that the starting conditions of the post-Cold War era were beneficial for the member states of the military alliance (NATO) and disadvantageous for the third state (the USSR's prime successor state that had lost its military alliance, the Warsaw Pact, and large parts of its own territory, such as Ukraine, Belarus, Moldova, and the Baltics in Europe, as well as a number of further territories in the Caucasus and Central Asia). Thus, ensuring political stability and military balance (*albeit* at a much lower level than in the Cold War) as empirical expressions of the post-Cold War era *status quo* was the vested interest of the member states of the military alliance.[476]

In the military alliance, the U.S. in his role as (sole) defender from a PDT point of view had a particular interest in retaining this *status quo* due to the self-perception of its foreign policy elites that the U.S. (and the Western democratic and economic model) had been the victor of the Cold War. The specific characteristics of the *status quo*, e.g., how it came into existence and what it meant for the foreign policies of a third state, like Russia, is briefly addressed in scope of NATO-Russia relations of subchapter 4.3. in the empirical analysis of Chapter 4.

[474] Examples for this flexible approach could be continuous divisions between states, which might or might nor erupt into conflict one day, such as the Greece-Turkey tensions over Aegean Sea islands of Greece or Northern Cyprus; general military deterrence issues between Finland or Sweden with Russia; or the general nuclear deterrence based on the strategic nuclear balance and mutually assured destruction (MAD) between the U.S and Russia.

[475] For reference, see for example: OSCE Network (2018): Reducing the Risks of Conventional Deterrence in Europe: Arms Control in the NATO-Russia Contact Zones, pp. 7-9, Hyperlink: https://osce-network.net/file-OSCE-Network/Publications/RISK_SP.pdf (Last visit: 04.10.2022).

[476] Wallander, C. (2000): Institutional Assets and Adaptability: NATO after the Cold War, pp. 717-733.

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Without much surprise to the reader, the U.S. and NATO policies chosen in the first decade of the post-Cold War era have imprinted a mark on Russian foreign policy that became increasingly contentious in order to change the empirical effects of this *status quo*.[477]

Thus, and taking the context of general deterrence into account, the empirical evidence rather points into the direction of an asymmetric unilateral game model as a much more fitting theoretical foundation for the Euro-Atlantic region of the post-Cold War era than a mutual deterrence game.[478]

Conventional deterrence: When looking at the conventional part of a military alliance's deterrence and defence posture, there seems to be a persuasive logic to relate the quantity of such weapon systems that have only local effects with a rivalry in congestion of that quantity; after all, a tank brigade or infantry battalion can only fight in a certain designated area at any one time. This aspect was already addressed from a conceptual perspective in subchapter 2.1.3 and is called 'force thinning' due to the limitation of a state's armed forces of being present in any place at any time of the territory and where the state, as a consequence, must deploy its forces selectively or spread them thin across a defence perimeter. The states of military alliances know obviously their own national limitations, but are also aware under PDT's incomplete information that certain limitations regarding military support by the allied member states exist. From a geopolitical perspective, particular those states that have a so-called exposed border, which make them vulnerable to third states' military threats and actions, might particularly compete for the distribution of an alliance's military resource in terms of forward deployment of forces.

While this alliance-internal deliberation process about the distribution of resources amongst competing member states is not revisited in the further subchapters of this dissertation, because it rather represents rather immediate deterrence than general deterrence cases, an important criterion for the evaluation, if the deployment of military resources by the military alliance in a certain member state is required, is the extent of the challenger's military capabilities[479], as theoretically highlighted in subchapter 3.1.1. In this sense, member states with exposed borders to a third state challenger, who is militarily capable, usually receive much attention inside a

[477] Simes, D. (2007): Losing Russia: The Costs of Renewed Confrontation, pp. 36-48 and pp. 50-52.
[478] Quackenbush, S. (2011): Deterrence theory: where do we stand?, pp. 749-752; and: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 133-135 and pp. 175-182.
[479] A challenger might require a large ground force to threaten more than one adjacent state at a given time (e.g. the Baltics, Poland, Ukraine, Georgia) or it must have considerable maritime, amphibious and air(borne/mobile) forces to threaten an island or peninsula from international waters/foreign sea territory (such as the UK).

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military alliance, given that revisionist challenger will most likely threaten these neighbouring member states before any other member states.[480]

With an empirical view to the 2014 Russian annexation of Crimea, e.g., NATO's most exposed states would be Estonia, Latvia and Lithuania in the Baltic as well as Poland, who all share a border to either mainland Russia or the Russian exclave Kaliningrad *oblast*; the later one has gained the reputation of a politico-military hotspot for NATO-Russia relations in general and NATO's deterrence and defence posture at its eastern flank.[481]

On a geographically different side of NATO, i.e., the southern flank and the Balkans, there are member states with a different threat perception that might also want to request military support view of politico-military insecurity spilling in from the Middle East and North Africa (MENA) region, for example from Syria, Iraq and Libya.

From a theoretical perspective, these empirical examples from NATO show that member states of a military alliance must constantly bargain over the distribution of usually scarce military resources terms of defence finance, military personnel and military capabilities by prioritising and balancing the needs of the members states that are divergently affected from the threats coming from different geographically set attack vectors.[482]

So, and in a nutshell, the issues concerning conventional deterrence due to 'force thinning' in view of scarce military resources essentially leads to the insight that the national goal of military security becomes an impure public good, for which allied member states increasingly compete with an increase in size of the military alliance[483], if they perceive that a challenger might issue a threat or already have issued a threat 'even further down the road'. From a structural perspective, there exist explanations, why states contribute to such a military alliance, when there is an imbalance between those that compete for military resources and subsequently benefit more from any pay-offs derived from forward deployment than other member states. Neoinstitutionalist interpretations of the state-to-state cooperative behaviour inside military alliances that is based on interdependency in security- and defence matters were shown in subchapter 2.3.2 or a trade-off between security-autonomy, wherein contributing states that do

[480] The 'weakest-link' suggests a focus on the amount of conventional deterrence of an alliance in those geographic regions that border third states. See: Murdoch, J. (1995): Chapter 5 – Military Alliances: Theory and Empirics, pp. 98 f. In: *Sandler, T./Hartley, K. (eds.): Handbook of Defense Economics, vol. 1*.

[481] The Conversation (2022): Kaliningrad: Russia's 'unsinkable aircraft carrier' deep in Nato territory, Hyperlink: https://theconversation.com/kaliningrad-russias-unsinkable-aircraft-carrier-deep-in-nato-territory-182541 (Last visit: 08.10.2022).

[482] For reference, see: Rynning, S. (2014): The geography of the Atlantic peace: NATO 25 years after the fall of the Berlin Wall, pp. 1386-1401; and: GMF (2022): NATO's Sub-strategic Role in the Middle East and North Africa, Hyperlink: https://www.gmfus.org/news/natos-sub-strategic-role-middle-east-and-north-africa (Last visit: 08.10.2022).

[483] Hartley, K./Sandler, T. (1999): NATO Burden-Sharing: Past and Future, pp. 675 f.

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not have exposed border might receive benefits from those that receive the military resources were given in 2.4.1 on public good theory. Given that general deterrence does not focus on a concrete crisis or conflict, this dissertation remains at the lower level of granularity by simply determining a the extend of a military alliance's conventional deterrence and defence posture in member states with exposed territories is an important indicator for the alliance's robustness in deterring and defending said member states against any potential military action of a clearly defined adjacent third state challenger.

Nuclear deterrence: Till the first use of the atomic bomb on Hiroshima and Nagasaki in August 1945, the majority of weapon systems had been conventional nature in the history of warfare.[484] Since the advent of the 'nuclear age', the atomic bomb and its more advanced successor, namely the thermonuclear/hydrogen/fission-fusion weapon (furthermore be abbreviated as nuclear weapon or simply as warhead), has influenced the lives of countless people around the globe than any type of weapon in world history.[485]

Numerous researchers from various disciplines, *inter alia*, from political science, mathematics, economics, and other, have dedicated their research on grasping the complex implications of this technology; this includes research from a game-theoretic perspective. One of the key questions asked was, whether nuclear weapons had a stabilising effect on inter-state affairs and if nuclear proliferation would have been a 'pacifier' in regard to inter-state conflict, including wars, due to the sheer destruction they could cause when both sides deployed them.[486]

In light of how nuclear weapons affect military security, the defender needs to adapt their own policy strategies, when the challenger is a nuclear-armed power and is therefore capable of issuing a nuclear threat. Conceptually, the defender (and his protégé) must resist 'nuclear brinkmanship', i.e., the blackmailing of state by an aggressor that is based on the threat to escalate a crisis/conflict through the use of nuclear weapons. Nuclear brinkmanship is an aggressor's instrument of power against particularly those states that do not have nuclear weapons on their own. In exchange for the protégé's freedom of choice regarding their political

[484] As a caveat, it should be mentioned that biological and chemical warfare has been present on battlefields in one form or another since the Middle Ages. Chemical warfare became industrialised through World War 1, but became a 'weapon of terror' in more contemporary times, e.g. in the 1995 Sarin gas attacks in the Tokyo subway or 2001 anthrax attacks in the U.S. the wake of 9/11. In the scope of this dissertation, such 'weapons of mass destruction' are discarded in favour of (thermo-)nuclear weapons the most effective deterrent. For further input on biological and chemical weapons, see for example: Yamin, T. (2013): Chemical & Biological Weapons: Positions, Prospects and Trends, pp. 147-159; Mandel, R. (1993): Chemical Warfare: Act of Intimidation or Desperation?, pp. 188-190; and: Metcalfe, N. (2002): A Short History of Biological Warfare, pp. 187-208.

[485] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 3-6.

[486] Quackenbush, S. (2011): Deterrence theory: where do we stand?, pp. 751 f.

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decision-making, the aggressor would promise not to use his nuclear weapons to force the protégé into compliance (this is, at least, the theory).[487]

While often considered as the central issue that burdened Western defence policy-making of the Cold War era, the threat of nuclear weapons continued throughout the post-Cold War era *albeit* with a different tune between the nuclear-armed players. Whereas previously the greatest threat arose from the enormously large nuclear arsenals of very few states by a deliberate or accidental nuclear first strike, the post-Cold War era saw the proliferation of nuclear weapon technology and spread of long-range ballistic missiles as delivery systems. The politico-military implication from those geopolitical developments subsequently propelled the U.S. (but NATO in its wake) to develop and deploy ballistic missile defence systems.[488]

In the scope of this dissertation, nuclear deterrence does nevertheless receive attention from a more traditional perspective, given that the key distinction between defender and protégé is the possession of nuclear weapons with the task to provide the military alliance with a capable and credible nuclear deterrent.[489] Furthermore, and in contrast to the 'force thinning' issue that arises in the deployment of conventional forces along a defence perimeter, the pure existence of a nuclear arsenal in a member state (defender) of a military alliance provides military security to everyone without rivalry in consumption in view of the public goods theory of 2.4.1. So, a military alliance could provide both, military security as an impure public good and military security as a pure public good.

Lastly, in view of the game-theoretic setting, which puts a nuclear-armed challenger and a nuclear-armed defender in a single game, implications arising from the existence of nuclear weapons must be logically be addressed.

3.4 Definition of two partial game models

So far, the following building blocks of the game have been described: The players of a military alliance consisting of a defender and protégé pursue military security on the basis of a credible

[487] Powell, R. (2015): Nuclear Brinkmanship, Limited War, and Military Power, Pp. 593-597; a more critical examination that argues in favour of conventional weapons as a means to gain more concessions from weaker states than the through the brinkmanship with nuclear weapons. In a nutshell, scalability of technologies used in a brinkmanship fashion provides more favourable results for the attacker than a dichotomous all-or-nothing nuclear threat. See: Schwarz, M./Sonin, K. (2008): A Theory of Brinkmanship, Conflicts, and Commitments, pp. 173-176.

[488] Powell, R. (2003): Nuclear Deterrence Theory, Nuclear Proliferation, and National Missile Defense, pp. 86-88.

[489] The 'best-shot' aims at explaining reliance of the allies on one exemplary ally, which provides the nuclear deterrent for the whole alliance. See: Murdoch, J. (1995): Chapter 5 – Military Alliances: Theory and Empirics, pp. 98 f. In: *Sandler, T./Hartley, K. (eds.): Handbook of Defense Economics, vol. 1.*

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and capable deterrent to ensure the perseverance of the *status quo* against a challenger that can issue threats against either defender or protégé of the military alliance. The conditions that govern this game were described as a case of an 'extended general unilateral conventional and nuclear deterrence game', whose individual characteristics were just described above.

In order to integrate the definitions and characteristics of the various aspects of the game into a consistent and structured archetypical game structure – a three-player sequential game tree in the case of this doctoral thesis' game-theoretic framework, an integrated conventional/nuclear deterrence game, is created. The basic game duration of this integrated game is is defined as finite, since the research question of this dissertation begins in 1992 and ends in 2016[490], but the game design structure is based on decision nodes, whose sequence could be extended infinitely; even though, from a PDT-theoretic perspective, increasing the nodes of the game also extend the potential outcomes, which in turn requires additional examinations regarding the game solutions *or* equilibria.

The finite integrated game is formally separated in two games. In this section, only the pure conventional partial game G_C^1 and the pure nuclear partial game G_N^2 are introduced[491]; hence, the two-partial game structure.

The pure conventional game G_C^1 is based on a deterrence game as presented by Quackenbush[492], which provides an extended unilateral conventional deterrence situation between three active players, namely challenger, defender, and protégé. Deterrence games can eventually be completed through several game solutions: Either player can concede, either player can succeed, and lastly, the challenger could simply stay with the *status quo*.

In order to introduce nuclear deterrence into the game structure, the pure nuclear game G_N^2 is introduced, which provides those players with nuclear weapons the option to escalate the game. If they do so, the game basically becomes a two-player game at the next node, because only capable players, i.e., those with nuclear weapons, are able to defy (with their own nuclear weapons). Throughout this dissertation, challengers and defenders are always conventionally and nuclear-armed states, while protégés do not have nationally owned nuclear weapons at their disposal.[493] As explained above, it is logical conclusion that the pure nuclear partial game G_N^2

[490] G^L means G "Long".

[491] G_F^1 means G '1st game, Front' because it occurs before the other partial games. G_C^2 means G '2nd game, Conventional', and G_N^3 means G '3rd game, Nuclear'.

[492] For a general reference, the key literature is: Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence.

[493] There are two necessary remarks: From an empirical point of view, the U.S. plays the role of defender throughout all games, even though France and the UK could theoretically be defender as well thanks to their own national nuclear arsenals. And furthermore, the U.S. pursues a NATO nuclear sharing arrangement with European NATO allies, who provide the dual-capable aircraft to deliver U.S. nuclear weapons to their targets as

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should logically be used in conjunction with G_C^1, because a purely nuclear deterrence situation without conventional component might be empirically difficult to identify[494].

With the two pure partial games, the 'extended unilateral conventional and nuclear deterrence game' have been addressed, so the remaining part to be included is the aspect of 'general deterrence'. In line with Quackenbush, it must be stressed that general deterrence is an integral part of PDT, whose different variants of game-theoretic models do not pinpoint to crises situations. Instead, if interpreted from a more strategic long-term perspective, wherein the defender and protégé as military alliance aim at deterring the challenger from issuing a threat by remaining continuously prepared for defending the alliance's member states' territory for the case of deterrence fails.[495]

For better comprehension of the detailed structures parameters, the integrated game is graphically depicted in an extended-form game tree structure below:

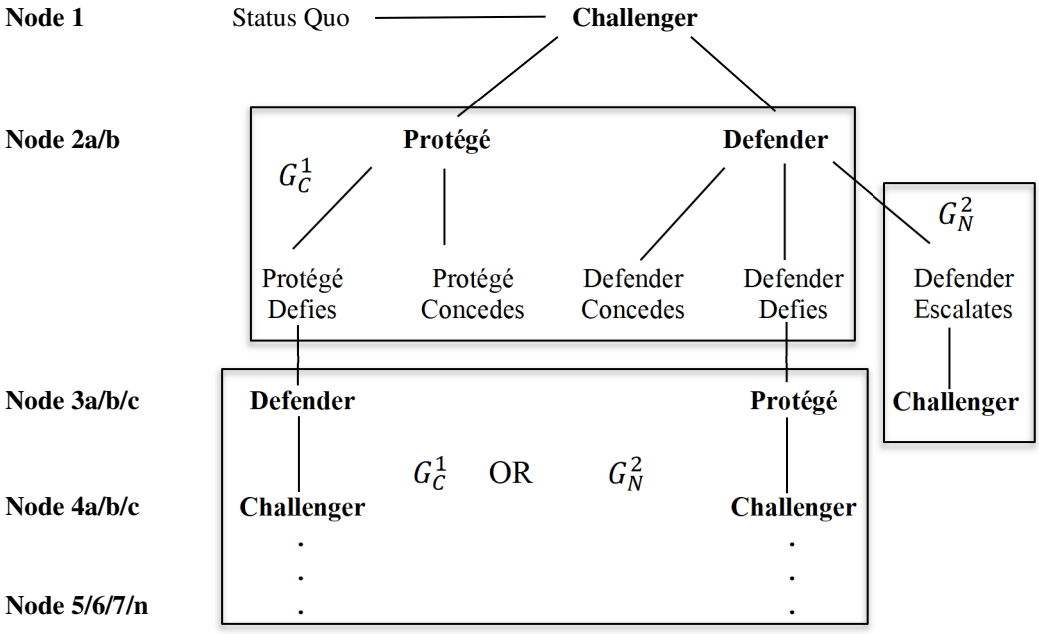

Figure 5: Abbreviated three-player extended unilateral deterrence game with asymmetric escalation extension adapted from Quackenbush and Zagare/Kilgour[496]

determined by NATO's Nuclear Planning Group (NPG). Until formal release of nuclear weapons by the U.S. President, those weapons remain in the full custody of U.S. military forces. Therefore, those allies actively contributing to NATO Nuclear Sharing are not considered nuclear-armed states and remain protégés. For reference, see: NATO (2022): NATO's Nuclear Sharing Arrangements – Factsheet, pp. 1-2, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/2022/2/pdf/220204-factsheet-nuclear-sharing-arrange.pdf (Last visit: 22.10.2022).

[494] For example, even in the 1962 Cuban Missile Crisis over the Soviet deployment of nuclear weapons on Cuba, the U.S. was first of all using its conventional navy for the naval blockade of the island.

[495] Quackenbush, S. (2011): Deterrence theory: where do we stand?, pp. 752-756

[496] For reference, see Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 565; and: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 222.

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The pure conventional deterrence game G_C^1 and pure nuclear deterrence game G_N^2 are presented in rectangular shapes due to their standard depiction in accordance with the regular PDT-related game-theoretic figures. Once the challenger threatens any player, G_C^1 can be played by both defender and protégé. It is expected that the game begins initially with a conventional challenge by the challenger against either defender or protégé that then the choice of conceding or defying the threat. In this simple model, all players take turns under G_C^1 until either the military alliance or the challenger concedes, thereby ending the game.[497]

In the above simple model, the nuclear-armed defender can also decide to escalate in reaction to a threat, which turns the game into G_N^2. A threatened defender can decide to escalate instead of the two standard reactions of the partial game G_C^1. When the defender escalates, the challenger has either the choice to defend (meaning the use of his own nuclear weapons) or back down. It is sufficient to explain at this moment that subchapter 3.2.3 goes into more detail about the enhancement of the core game, which also addresses the escalation options of the challenger and the rationale, why protégés do not play an active role after the game has moved from G_C^1 to G_N^2.

Empirically informed readers might question, why the model only contains one defender, as there might be more than one nuclear-armed state in a military alliance; after all, the case of NATO has three nuclear-armed states amongst its members. There are two reasons, why there is only one nuclear-armed defender: Theoretically, the model is simpler to build in regard to the decision-making structure, if only one member is able to escalate in a nuclear alliance. Empirically, NATO predominantly relies on the 'nuclear umbrella' of the U.S.[498], despite having UK and France as member states.[499]

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[497] There could also be scenarios, where a protégé might concede to the challenger and the defender keeps on fighting. Such immediate deterrence scenarios are not further addressed in this dissertation.

[498] "The strategic forces of the Alliance, and particularly those of the United States, are the supreme guarantee of the security of the Alliance. The independent strategic nuclear forces of the United Kingdom and France have a deterrent role of their own and contribute significantly to the overall security of the Alliance. […] NATO's nuclear deterrence posture also relies on the United States' nuclear weapons forward-deployed in Europe, as well as on the capabilities and infrastructure provided by Allies concerned. A number of NATO member countries contribute a dual-capable aircraft (DCA) capability to the Alliance. These aircraft are central to NATO's nuclear deterrence mission and are available for nuclear roles at various levels of readiness." (NATO). For reference, see: NATO (2022): NATO's nuclear deterrence policy and forces, Hyperlink: https://www.nato.int/cps/en/natohq/topics_50068.htm (Last visit: 19.07.2022).

[499] For more details on the background of the nuclear deterrent of both, France and the UK, see: Tertrais, B./Freedman, L. (2009): France and the United Kingdom, pp. 1-12 on France and pp. 23 f., 28-26, 41-46, Hyperlink: https://www.stimson.org/wp-content/files/file-attachments/Nuclear%20Security%20FINAL.pdf?msclkid=19cb3188a57f11ec967c91c53aa7e0ee (Last visit: 08.10.2022).

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3.4.1 A pure conventional deterrence game model

This subchapter provides an introduction to the pure conventional deterrence game G_C^1, which encompasses the general deterrence between a military alliance and a third states without the context of any concrete crisis. G_C^1 now focusses on 'PDT proper' in terms of the game-theoretic sequential interaction between three active players in a unilateral deterrence game with conventional military capabilities.

In the following sections, five elements are introduced: (1) The a three-player game structure with the turn order (nodes) based on PDT, (2) the definition of the prioritisation of game outcomes order of game outcomes, (3) the probabilities for each player's behaviour (either soft or hard and reliable or unreliable) in their respective turns of the game, and (4) a very brief overview of the complex equilibria of the game.

The three-player game structure: The partial game G_C^1 is built on Quackenbush's research about a three-player game model, wherein all players – challenger, protégé, and defender – take an active part in a sequence of interactions occurring at specific nodes of the game. It should be mentioned upfront that Quackenbush utilised this model for immediate deterrence and requires modifications in the operationalisation to cater for general deterrence cases.[500]

The following figure extends the simplified sequential game-tree provided as figure 4 in subchapter 3.1.3. For further understanding, the dashed lines in the separate those game decisions, where the only a two-player game unfolded due to the allied state not joining the game. The rectangular boxes provide the eventual game outcomes, if no one retreats and/or defies, i.e., bilateral conventional war between either challenger and defender or challenger and protégé or multilateral conventional war between challenger and defender plus protégé.

At node 1, the challenger must decide to stick with the *status quo or* issue a challenge against either the defender or protégé. At node 2a, the protégé is challenged and can respond by concession or defiance. Likewise at node 2b, the same choice is available for a challenged defender. Either defender or protégé, i.e., the player that was not challenged initially, must choose at node 3a *or* node 3b, if he joins the challenged ally or not. If the allied player does not come to the aid of the challenged player, the later one has to face a bilateral conventional war with the challenger. If, however, the defender or protégé joins the ally in his conflict, the challenger must decide at node 4a or node 4b, if he presses on, thereby risking a multilateral conventional war or if he retreats.[501]

[500] Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, pp. 563 f. and pp. 580 f.

[501] Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, pp. 565 f.

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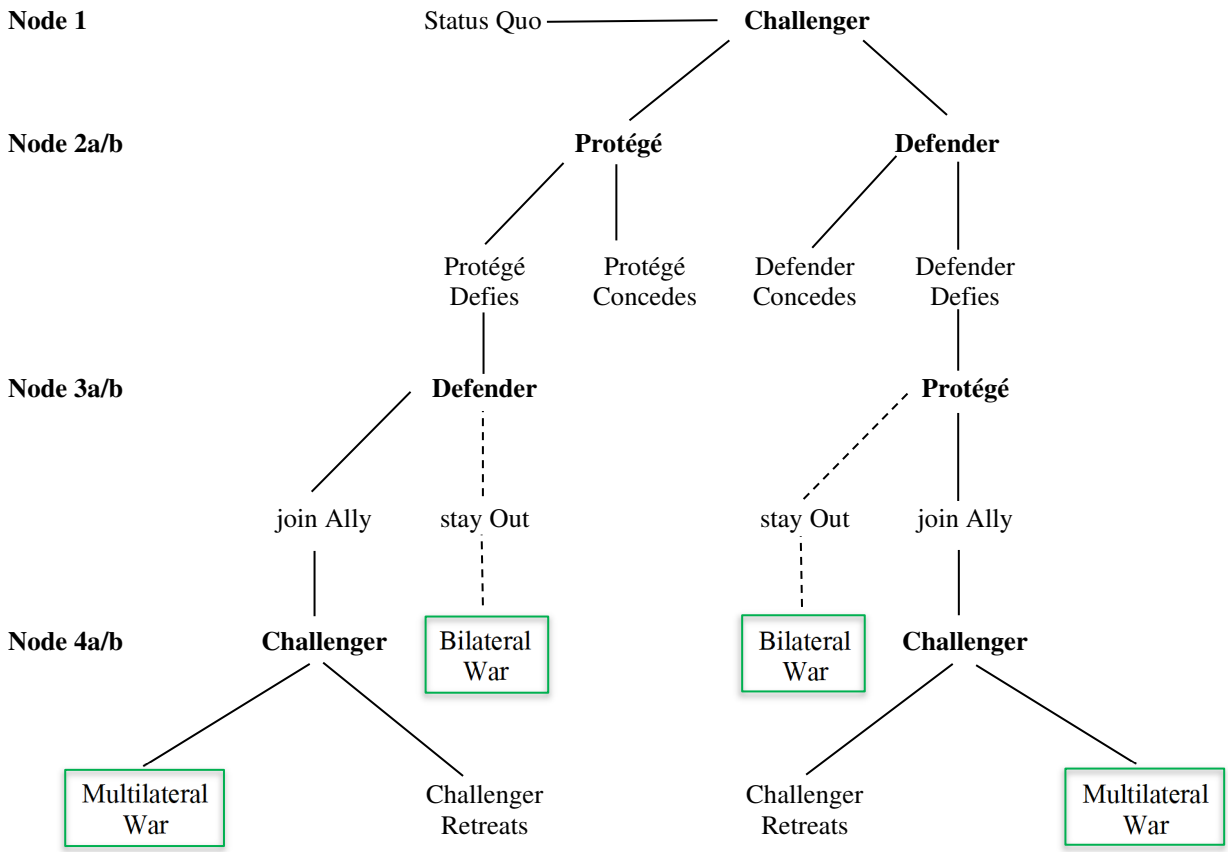

Figure 6: Three-player extended unilateral deterrence game limited to conventional forces according to Quackenbush[502]

The prioritisation of game outcomes: The decision that every active player takes at his node are based on the assumption of instrumental rationality, where each choice is the result of a complete and transitive evaluation[503], as explained in more detail in subchapter 3.1.1. Based on this instrumental rationality, each player maximises his own utility throughout the game and puts the choices leading to interaction results into an order of priority for each state. For the presented extended conventional deterrence game as graphically displayed above, the following preferences of each player, which is privately known only under incomplete information, exist[504]:

Challenger: $$DC > PC > SQ > BP > BD > [MW, CR] \quad (26)$$

Defender: $$CR > SQ > PC > \{MW, BP\} > [BD, DC] \quad (27)$$

[502] Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 565.
[503] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 39-44.
[504] Encoding: DC = Defender Concedes, PC = Protégé Concedes, CR = Challenger Retreats, SQ = Status Quo, BD = Bilateral War between Challenger and Defender, BP = Bilateral War between Challenger and Protégé, and MW = Multilateral War. The order of results in curved bracket {x} depends on the reliability of the allied Defender/Protégé (either reliable or unreliable) and the order of results in parenthesis [x] depends on the type of Challenger/Defender/Protégé (either hard or soft). Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 573.

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Protégé: $$CR > SQ > DC > \{MW, BD\} > [BP, PC] \quad (28)$$

In the preferences above, the position of two outcomes 'multilateral war' and 'bilateral war' of the allied player depends on the reliability of the non-challenged defender and protégé. A reliable defender/protégé prefers multilateral war over bilateral war, hence the respective non-challenged ally would come to support the challenged other player. Likewise, any player might pursue a hard or soft posture, wherein a hard challenger prefers multilateral war over its own retreat, while a soft defender or protégé prefer conceding instead of engaging a bilateral war alone against the challenger.[505]

The probabilities for each player's behaviour: Under the condition of incomplete information, the order of priority of each player is only known to himself, while players have a certain belief about the other player's preferences.[506] In that sense, there is a set of probabilities for each policy strategy choice that the active player can take at a given node. It applies:

Location	*Probabilities*
At node 1:	$u =$ probability that hard Challenger challenges Protégé $v =$ probability that hard Challenger challenges Defender
At node 2b:	$x_H =$ probability that a hard Defender defies $x_S =$ probability that an soft Defender defies
At node 3b:	$z_R =$ probability that a reliable Protégé joins Ally $z_U =$ probability that an unreliable Protégé joins Ally
At node 4b:	$a_H =$ probability that hard Challenger presses on $a_S =$ probability that soft Challenger retreats
At node 2a:	$w_H =$ probability that a hard Protégé defies $w_S =$ probability that an soft Protégé defies
At node 3a:	$y_R =$ probability that a reliable Defender joins Ally $y_U =$ probability that an unreliable Defender joins Ally
At node 4a:	$b_H =$ probability that hard Challenger presses on $b_S =$ probability that soft Challenger retreats

Table 10: Set of beliefs for the probabilities of the active player's strategy choices per node under incomplete information[507]

Brief overview of the complex equilibria of the game: Following the definition of the sequential structure of the three-player game, the order of preferences for the outcome of the overall game per player, and the set of beliefs on the probabilities for each player's decision, the final part of PDT can now be presented in order to complete the core model for the supergame: The equilibria of the game. Going through the different combinations of hard/soft and

[505] Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, pp. 573-575.
[506] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 143.
[507] For references, see: Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 574; and: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 146.

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reliable/unreliable for each defender and protégé, the following Perfect Bayesian Equilibria exist in a three-player extended deterrence game with incomplete information.

First of all, in the above probabilities, the challenger is hard at node 1. If the game is initiated by soft challenger, there would be only the *status quo* as singular possible Perfect Bayesian Equilibrium as the result, regardless of the other players.[508] On the condition that the challenger is hard and the defender's and protégé's statuses are unknown, Quackenbush has extracted a total of 14 possible Perfect Bayesian Equilibria[509] with four Deterrence Equilibria (Outcome: *Status quo*), six Defence Attack Equilibria (Outcome: Challenger attacks Defender with the result that deterrence fails), and four Protégé Deterrence Equilibria (Outcome: Challenger attacks Protégé with the result that deterrence fails).[510] While the logical foundation of PDT is thus well-defined and increasingly complex, when further elements are added, such as the third active player[511], the theoretical model requires a comprehensive transformation into an operationalizable framework in order to be usable for an empirical case study analysis.

3.4.2 A pure nuclear deterrence game model

This subchapter introduces the partial game G_N^2, which provides the challenger and defender with a choice for threatening nuclear escalation. The difference between conventional and nuclear weapons, and thus the difference between conventional and nuclear deterrence rests in the massively increased scale of destruction as a consequence of nuclear weapon's usage. Subsequently, there is no doubt that the existence of a nuclear arsenal in at least one if not two states in opposing sides, which are involved in a deterrence game, represents a decisive element for the outcome of the game.[512]

In a historical perspective, Forsyth shed some light on the complexity of U.S. strategic decision-making at the highest echelons of power in response to the deployment of Soviet nuclear missile on Cuba in 1962, since any U.S. military action was seen as having repercussions in other geopolitical settings at the time, such as divided Berlin. At that moment, U.S. President

[508] See footnote no 12 in: Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 573; and: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 148 f.
[509] The table with all 14 Perfect Bayesian Equilibria and their existence conditions can be found under No. I the Appendices.
[510] Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, pp. 574-580.
[511] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 144-148; and: Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 566.
[512] In U.S. Cold War nuclear planning, the minimum yield for assuring the critical crippling of the Soviet Union amounted to 440 megaton TNT equivalent in nuclear weapons. In order to guarantee the Soviet Union's destruction as a second-strike capability, those numbers had to be tripled, because every 'leg' of the nuclear triad (e.g. bombers, ground-based missiles, submarines) had to be armed accordingly. For reference, see: Wirtz, J. (2018): How Does Nuclear Deterrence Differ from Conventional Deterrence?, pp. 61-64.

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Kennedy had, *inter alia*, the possibility to escalate the conflict due to U.S. perceptions that any U.S. military action might trigger a Soviet response, most exemplary a potential attack against the divided city of Berlin at the forefront of the East-West frontier in Europe. Decision-makers of both sides at the time eventually found an accommodating solution to the conflict, but the interpretation and use of nuclear weapons as a political instrument to achieve politico-military goals has become obvious with the Cuban Missile Crisis.[513]

Nothing reflects the politics of nuclear weapons better than the political *credo* that "[a] nuclear war cannot be won and must never be fought" (Reagan/Gorbachev)[514]. In this same spirit, five nuclear powers (China, Russia, France, UK, US) made a joint pledge in the pre-2022 Russian invasion of Ukraine time:

> "As nuclear use would have far-reaching consequences, we […] affirm that nuclear weapons—for as long as they continue to exist—should serve defensive purposes, deter aggression, and prevent war." (U.S. White House press communication)[515]

Despite the mutually acknowledged irrationality of making use of a nuclear arsenal against another nuclear power, the politico-military consideration to make use of these kind of weapons can still be rational, as Jervis pointed out. If a state evaluates that he might recover from a mutual nuclear exchange more quickly than its rival, using nuclear weapons could become a viable strategy.[516] Classical deterrence theory explained these contradictory implications for the national decision-making as "leave something to chance" (Schelling)[517], which should regularly lead to a breakdown of general deterrence, because non-cooperation could provide a higher pay-off than cooperation.[518] For PDT, a threat must be rational in order to be credible. This also means that regardless of the nature of the potential conflict (conventional or nuclear), it is rational for the defender to have sufficient capabilities in order to remain credible of conducting a retaliatory nuclear second-strike for the test case that deterrence fails and the challenger has actually decided to launch a nuclear surprise attack.[519]

Separate from the use of nuclear weapons in an offensive-defensive scenario of actual war planning, regardless if hypothetically anticipated over the course of a timeframe or immediately

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[513] Forsyth, J. (2017): Nuclear Weapons and Political Behavior, pp. 119-121.
[514] European Leadership Network (2021): The Reagan-Gorbachev Statement: Background to #ReaffirmOurFuture, Hyperlink: https://www.europeanleadershipnetwork.org/commentary/the-reagan-gorbachev-statement-background-to-reaffirmourfuture/ (Last visit: 13.11.2022).
[515] US White House (2022): Joint Statement of the Leaders of the Five Nuclear-Weapon States on Preventing Nuclear War and Avoiding Arms Races, Hyperlink: https://www.whitehouse.gov/briefing-room/statements-releases/2022/01/03/p5-statement-on-preventing-nuclear-war-and-avoiding-arms-races/ (Last visit: 13.11.2022).
[516] Jervis, R. (1988): The Political Effects of Nuclear Weapons: A Comment, pp. 85 f.
[517] Lebow, R. (1996): Thomas Schelling and Strategic Bargaining, p. 570.
[518] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 30-32.
[519] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 285-301.

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threatened at a discrete time, nuclear weapons can also be used in a more indirect way, where politics theoretically prevail over the full course of the deterrence game. If the game is understood not only as a deterrence but also a bargaining situation, a capable state can use nuclear weapons as a political instrument to threaten another state in order to achieve a political goal, such as concession to the challenger's specific demands. By applying 'game of chicken' as presented in subchapter 2.4.6, to concrete crises, states pursue a 'brinkmanship' (Schelling) strategy, whereby they put the threatened state into the precarious situation to decide between the risk of conflict escalation or giving in.[520] The use of nuclear weapons for nuclear blackmail (an alternative term for brinkmanship) appears to be viable strategy for a nuclear-armed state, if he engages non-nuclear weapon states. Sechser and Furhmann did not dispute this general argument, but questioned whether a nuclear-armed state is able to actually extort territorial gains from a state by threatening nuclear attacks on the other state's territory or even capital. Amongst the empirical research studies that both researchers briefly summarised, case studies, wherein nuclear weapons just contribute to politico-military background of a game instead of being the core issue of it appear to be a research gap.[521]

In this section, the following elements in enhancement of the previously introduced pure nuclear deterrence game are introduce: (1) A simplified game structure game that is based the initial issuance of a nuclear threat by the challenger, with (2) the definition of the prioritisation of game outcomes per player in this specific setting, and (3) the probabilities for each player's behaviour (either soft or hard and reliable or unreliable) in a nuclear threat challenge.

Given that conventional and nuclear threats normally go hand in hand, where challengers might first want to issue a conventional threat and wish to keep an escalation based on nuclear weapons for a later node of the game in order to increase pressure on the other side, the issuance of a nuclear threat by the challenger at the first node is rather hypothetical. Furthermore, from both a game-theoretic perspective and empirical point of view, an initial nuclear threat entails considerable risks for the challenger, who must signal that his nuclear threat is credible and would be executed(!), if the defender and/or protégé defies. In view of the empirical reflections from political decision-makers regarding the impossibility of a mutually destructive exchange of nuclear weapons in war, no equilibria are provided for the simplified partial nuclear game.

The game structure based an initial nuclear challenge: As a simple introduction to nuclear deterrence, the following interpretation of a three-player sequential unilateral deterrence game provides a challenger that issues a nuclear threat as singular against either protégé or defender

[520] Nalebuff, B. (1986): Brinkmanship and Nuclear Deterrence: The Neutrality of Escalation, pp. 20-23.
[521] Sechser, T./Fuhrmann, M. (2013): Crisis Bargaining and Nuclear Blackmail, pp. 175-180.

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at the beginning. The game thus has an almost identical design to the conventional three-player game model, but the theoretic considerations of the order of priorities per player and the set of probabilities proves that a deterrence game based on nuclear weapons ultimately crowds out the protégé as the sole player incapable of making a credible nuclear threat due to its lack of nuclear weapons.

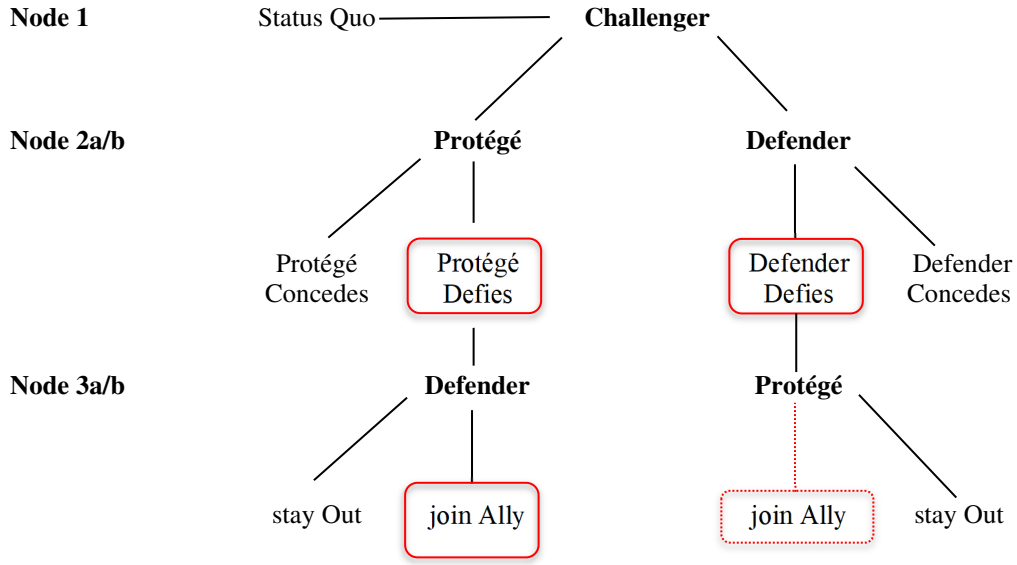

Figure 7: Three-player extended unilateral deterrence game with initial nuclear threat by challenger derived from Quackenbush[522] and Zagare/Kilgour[523] [own illustration]

In the game above, there are two game decisions that can lead to mutual strategic nuclear exchange: (1) If the defender is the target of the challenge and the defender defies, a nuclear war between challenger and defender unfolds, and (2) when the protégé receives a nuclear blackmail attempt by the challenger and the defender comes to support its allied protégé (reliable defender), a nuclear war between challenger and defender begins as well. In this constellation, the protégé's contributions to that war can be considered marginal at best, such as contributing dual-capable aircraft for a nuclear sharing arrangement[524]; this is represented by the small dotted line in the figure.

One game decision can lead to a one-sided nuclear attack, namely at node 3, but the defender needs to decide to stay out of a bilateral conflict between protégé and challenger (unreliable defender). The most extreme outcome of this scenario would be the destruction of the non-nuclear protégé without any chance for nuclear retaliation of the attacker.

[522] Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 565.
[523] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 204.
[524] NATO (2022): NATO's Nuclear Sharing Arrangements – Factsheet, pp. 1-2, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/2022/2/pdf/220204-factsheet-nuclear-sharing-arrange.pdf (Last visit: 22.10.2022).

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In a nutshell, there are three possibilities, wherein nuclear war is avoided: If the threatened (1) defender at node 2b or (2) protégé at node 2a are either soft and prefer to concede. The behaviour of the allied player (reliable/unreliable) can then be ignored. Lastly, (3) if the challenger is soft and resorts to the *status quo* instead of issuing a nuclear threat, nuclear war would also be avoided, but then this partial nuclear game would not be played at all.

The prioritisation of game outcomes per player in response to a nuclear challenge: For completing the simple nuclear deterrence model, the individual utilities of the three players, only known to himself, under incomplete information against the backdrop of an issued challenge based on nuclear blackmail are[525]:

Challenger: $$DC > PC > SQ > BNP > [CR, NCD] \quad (29)$$

Defender: $$CR > SQ > PC > \{BNP, NCD\} > [DC, NCD] \quad (30)$$

Protégé: $$CR > SQ > DC > [\{NCD\}, PC] > BNP \quad (31)$$

As key foundation of the game's initiation, the challenger values the pay-off that he receives from the *status quo* with the expected pay-off, if he issues a nuclear threat, which might escalate into a nuclear conflict.[526] The problem for the challenger is that all players understand that the challenger pursues a hard posture at node 1, because he actually issued the nuclear threat. However, he does not know, whether defender and/or protégé are hard or soft.

The best result of the partial nuclear game for the challenger is, if the targeted player, either protégé or defender, is soft because the probability of the protégé/defender to concede in face of a nuclear threat is high and the allied player would not be able to respond anyway, because the game has already ended at node 2. The pay-off from threatening the nuclear-armed defender, when the soft defender concedes, would obviously be greater, than threatening the weaker protégé. However, there is also a risk for the challenger, if the defender is hard that the game spirals out of control through nuclear war.

The second-best threat for the challenger is therefore, if he restricts himself to initiating a nuclear threat against the non-nuclear protégé only under the expectation that the defender stays out (unreliable). Regardless, if the protégé concedes or defies (hard *or* soft), the challenger could effectively enforce his will on the protégé without retaliation.

[525] Encoding: DC = Defender Concedes, PC = Protégé Concedes, CR = Challenger Retreats, SQ = Status Quo, BD = Bilateral War between Challenger and Defender, BNP = Unilateral nuclear war of the Challenger against the Protégé, NCD = Nuclear war between Challenger and Defender. The order of results in curved bracket {x} depends on the reliability of the allied Defender/Protégé (either reliable or unreliable) and the order of results in parenthesis [x] depends on the type of Challenger/Defender/Protégé (either hard or soft). The representation was adapted from: Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 573.

[526] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 160 f.

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On the other side of the spectrum for the challenger, a hard defender will always fight a mutual nuclear war with the challenger, regardless what the allied protégé decides. As a consequence, the challenger would never initiate a nuclear threat against a hard defender and rather prefer the *status quo*.

The probabilities for each player's behaviour in a nuclear threat challenge: Under incomplete information, the following probabilities are therefore the identified relevant probabilities for a three-player game with a nuclear-armed challenger and defender, as well as a non-nuclear protégé:

Location	*Probabilities*
At node 1:	$u =$ probability that hard Challenger challenges Protégé $v =$ probability that hard Challenger challenges Defender
At node 2b:	$x_H =$ probability that a hard Defender defies $x_S =$ probability that an soft Defender defies
At node 2a:	$w_H = w_s = 1$ probability that a hard/soft Protégé defies[527]
At node 3a:	$y_R =$ probability that a reliable Defender joins Ally $y_U =$ probability that an unreliable Defender joins Ally

Table 11: Set of beliefs for the probabilities of the active player's strategy choices per node under incomplete information[528]

There is a major insecurity in the calculation for the challenger under incomplete information because he cannot know, if the protégé is hard and his allied defender is reliable. The game would always evolve in a nuclear war, if the threatened protégé is hard and allied defender reliable. Since it is known that the protégé will never prefer unilateral nuclear war against himself due to the missing retaliatory capabilities, the probability for a mutual nuclear war lies solely in the nuclear-armed defender's alliance reliability.

If the threatened protégé is hard, but the defender is soft, the defender faces a moral dilemma: The soft defender prefers the protégé's concession over a challenger's unilateral nuclear war against the protégé over the defender's concession over mutual nuclear war. Thus, a soft defender must choose being unreliable towards its ally in order to comply with its own order of preferences.

[527] The protégé must always defy at node 2a, regardless if he is soft or hard. Otherwise, the game would end with the result 'Protégé concedes'. Quackenbush acknowledged that there could be cases, where the challenger still engages the protégé militarily despite the protégé's concession and the allied defender decided to join the fight or had the intention of fighting against challenger regardless if the target had just been only the protégé. For reference, see: Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 566.

[528] The challenger needs always be hard at node 1 to avoid the status quo outcome, since a soft challenger does not offer a credible threat. See: Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, pp. 565, 567, 574; and: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 146.

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On the other side, the challenger does not know, if the defender values its reliability towards its allied protégé as higher than its national survival, thereby staying true to any commitments towards its allies choosing mutual nuclear war over leaving the ally to the challenger's unilateral nuclear threat. In that same vein, a challenger could also calculate that the defender is unreliable, therefore the defender would only fight a mutual nuclear war, when directly threatened by the challenger, but leaving allies to their own fate.

Thus, a hard protégé will always try to make sure that the allied defender is brought into a position that he remains a reliable ally. If the probability of the defender being reliable is high, a protégé might feel inclined to rather defy, thus applying a hard posture at node 2a as well. In a theoretic nutshell, the only relevant factors that ensure the *status quo* in a unilateral nuclear deterrence game are (1) the defender's posture, if directly threatened, and (2) the defender's reliability, if a hard protégé is threatened.

3.5 An integrated conventional/nuclear deterrence game model

Both pure deterrence games G_C^1 and G_N^2 as presented under 3.3.1 and 3.3.2 are very simplified model of the empirical reality. Drawing upon PDT's two (of the three) conceptual foundations – credibility and capability – a state might have nuclear capabilities, but issuing a nuclear threat as part of a first challenge against a defender/protégé alliance is only be credible in the most extreme cases, such as a direct nuclear threat against the defender's territory. Even in the course of the Cold War, credibility in conjunction with nuclear weapons were tackled with great care and received thorough review after the Soviet Union gained nuclear parity at the end of the 1950s.[529]

The more complex three-player game, the fully integrated singular game model that combines the two pure partial game models of the two previous subchapters can provide a comprehensive reflection of relationship between extended conventional and nuclear deterrence with a view to the empirical analysis. Subsequently, the overview of this section mirrors what has already been performed in the two previous subchapters.

The following elements are introduced: (1) The integrated game structure game that combines the conventional and nuclear partial games into a seamless singular game tree, with (2) the definition of the prioritisation of game outcomes per player in this specific setting, and (3) the probabilities for each player's behaviour.

[529] For a brief comparison of U.S. and Soviet strategic posturing in the early Cold War, see: Kolkowicz, R. (1971): Strategic Parity and Beyond: Soviet Perspectives, pp. 438-440.

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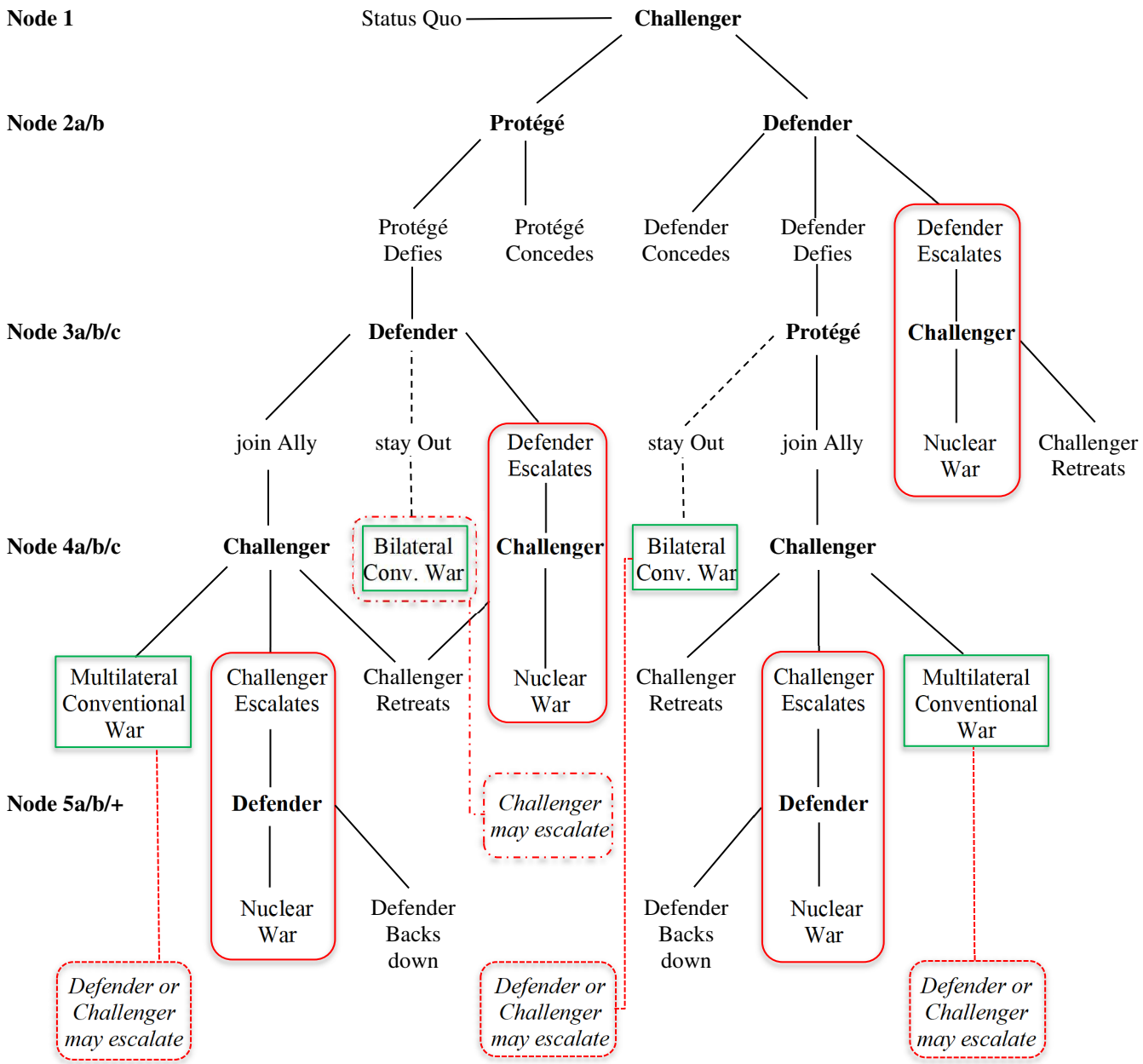

Figure 8: Three-player extended unilateral deterrence game with conventional and nuclear forces derived from Quackenbush[530] and Zagare/Kilgour[531] [own illustration]

In this more complex integrated game model above, a hard challenger initiates a conventional threat against either the protégé or defender at node 1.[532] The key difference to previous game models of this dissertation is the opportunity for the nuclear-armed players, namely defender at node 2b and 3a as well as the challenger at node 4 a, b and to choose from three options: (1)

[530] Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 565.
[531] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 222.
[532] Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 573.

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Retreat/concede, (2) defy reciprocally by conventional means[533], and (3) escalate with a nuclear threat. Logically, if neither defender nor challenger have escalated at node 4 the latest, the game continues from node 5 on forward and either defender or challenger can escalate in turn-taking nodes until one side either gave in or escalated with the final reaction of the other player to back down or defy with nuclear weapons. Thus, in the long-run, any game involving at least one nuclear-armed player can end in a one-sided nuclear war or if defender and challenger are involved, in a mutual strategic nuclear exchange.

The definition of the prioritisation of the integrated game per player: The utilities in order of preference under incomplete information for each player, as only known to himself, are the following:[534]

Challenger: $$DC > PC > SQ > CEP > BP > [CED, BD] > MW > [CR, NW] \quad (32)$$

Defender: $$CR > SQ > PC > DEC > DEP > \{MW, BP\} > BD > [DC, NW] \quad (33)$$

Protégé: $$CR > SQ > DC > \{MW, BD\} > [BP, PC] > NW \quad (34)$$

In the sequential game tree, there are two starting points, a hard challenger can either threaten the protégé or the defender. The following part of the game tree begins with the "left side", i.e., the challenger desires a concession from the protégé and thus initiates a conventional threat. When the protégé defies at node 2a, the defender decides at node 3a whether to join the ally or stay out. If the defender stays out, the challenger can choose CEP at note 4b and later without any risk of retaliation by the protégé, thereby foregoing bilateral conventional war.

If the protégé defies at node 2a and the defender reliable at node 3a, the challenger needs to decide at node 4a, if he retreats, defies or escalates. A soft challenger will never escalate at 4a, because bilateral war with the defender, multilateral conventional war and eventually retreat are more preferable than nuclear war. A hard challenger will never choose to retreat at node 4a because every other solution is better than retreating. If the defender decided to escalate at node 3a, a hard challenger will always defy and fight NW while a soft challenger will always retreat at node 4b.

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[533] Key condition for reciprocal defiance is that the defender's credibility to give a "response-in-kind" (Zagare/Kilgour). See: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 203 and p. 224.

[534] Encoding: DC = Defender Concedes, PC = Protégé Concedes, CR = Challenger Retreats, SQ = Status Quo, BD = Bilateral War between Challenger and Defender, BP = Bilateral War between Challenger and Protégé, and MW = Multilateral War. The following elements have been added to the previously introduced game: CEP = Challenger escalates against Protégé, CED = Challenger escalates against Defender, DED = Defender escalates against Challenger on his own behalf, DEP = Defender escalates against Challenger on behalf of the Ally, and NW = Nuclear War. The order of results in curved bracket {x} depends on the reliability of the allied Defender/Protégé (either reliable or unreliable) and the order of results in parenthesis [x] depends on the type of Challenger/Defender/Protégé (either hard or soft). The representation was adapted from: Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 573. Further comprehensive point of reference for the order of preferences of the enhanced model is: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 203-205 (Massive Retaliation), 221-226 (Flexible Response).

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If the challenger issues a threat against the defender at node 1, the defender has the first-mover advantage to decide between concession, defiance, and escalation at node 2b. A hard defender will never choose concession, while a soft defender never chooses escalation and risk the worst outcome (this is logical, since the challenger signalled a hard posture through his initial choice to issue a threat instead of keeping the *status quo*). A protégé needs then to decide, whether to join the allied defender. It is also just logical that a non-nuclear protégé has no role, when the defender decided to escalate at node 2b, so the protégé does only join, if the defender chose defiance at node 2b. If the protégé stays out of the conflict, a bilateral conventional between defender and challenger ensues, whereby any side can decide to escalate at node 4+. If the protégé joins the allied defender, the 'ball is in the challenger's playing field': A hard challenger never backs down and soft challenger never escalates. At any point after node 4+, defender and challenger can initiate an escalation.[535]

The question now arises, if the defender is only able to credible initiate a nuclear escalation, either when threatened conventionally by the defender at node 2b himself or on behalf of his ally at node 2a instead of retaliating with conventional means first. If confirmed, such cases constitute an all-or-nothing approach in nuclear deterrence, which is conceptually known as 'Massive Retaliation' doctrine. Since this doctrine had been discarded by NATO at the end of the 1950s due to the expectation that early nuclear escalation by the defender in response to a conventional threat lacks credibility.[536] The nuclear escalation choices at node 2a/b for the defender are mentioned for completeness of the model but not further deepened in view of the post-Cold War environment.[537]

It is assumed that the defender retains to nuclear capabilities to escalate early in a deterrence game, however remains able to reciprocally respond with conventional means, thereby also enabling the protégé to join in to change the conventional military balance and getting the challenger into a position, where he rather decides to retreat than press on. In comparison to the all-or-nothing approach, allowing for a limited conflict with the potential to escalate circumscribes the 'Flexible Response' doctrine, conceptually and theoretically outlined in more detail in the next subchapter.[538]

[535] For reference to the dyadic relationship between challenger and defender with an escalation option under incomplete information, see: Zagare, F./Kilgour, D. M. (1995): Assessing Competing Defense Postures: The Strategic Implications of "Flexible Response", pp. 380 f.; and: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 221-224.
[536] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 197-199, 219 f.
[537] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 197-200, 203-214.
[538] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 224-246.

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Completing the description of the game from the challenger's perspective of the different outcomes from the nodes 2+: Summarising nuclear escalation for the challenger, it is most cost-efficient, if directed at a protégé that does not defy or if defiant, has only an unreliable allied defender. Furthermore, a soft challenger will never issue a nuclear escalation against a defender at node 4a/b/c, thus rather fighting conventionally either against one or both players, and eventually retreating. A hard challenger will never retreat at 4a/b/c, since CR is worse than NW. Thus, the logical conclusion from this order of preferences of the different players in the enhanced deterrence game model are that the defender's posture at node 2b and 5a/b as well as reliability at node 3a, identified as key decisive factors for the outcome of any game play in the simplified nuclear deterrence model, has been validated from the simplified nuclear deterrence game for the general game-theoretic framework of this doctoral thesis[539]. In addition, the response of the challenger at node 4a and 4b under the assumption that the defender's first response is conventional, is another key decisive factor, which must be taken into account by the defender's (and protégé's) military doctrine.

The probabilities for each player's behaviour in the integrated game: In the scope of PDT proper, as Zagare and Kilgour formalised the nuclear doctrines on the basis of different sets of probabilities for the players of a deterrence game with incomplete information.[540] The table below provides a set of probabilities for a game, adapted to fit the characteristics of a three-player scenario of the enhanced nuclear deterrence model:

Location	*Probabilities*
At node 1:[541]	u = probability that hard Challenger initiates against protégé v = probability that soft Challenger initiates against protégé
At node 3a:[542]	x_H = probability that a hard reliable Defender responds − in − kind x_S = probability that an soft reliable Defender responds − in − kind
At node 3a:[543]	y_H = probability that a hard reliable Defender escalates y_S = probability that a soft reliable Defender escalates
At node 4a:	w_H = probability that hard Challenger escalates w_S = probability that soft Challenger escalates

Table 12: Set of beliefs for the probabilities of the active player's strategy choices per node under incomplete information[544]

[539] Again, under the condition that a challenged protégé must be hard, i.e. defy, at node 2a in order to allow for the defender to react in this model. See: Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 566.
[540] For comparison of the different sets of probabilities for 'Massive Retaliation' and 'Flexible Response', see:
[541] Caveat: Assuming the challenger never issues an initial challenge against the defender at node 1, when the challenger believes that the defender has a credible nuclear deterrence. Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 203 and p. 225.
[542] Caveat: Assuming the protégé defies at node 2a, because he perceives the defender to be reliable.
[543] Caveat: Assuming the protégé defies at node 2a, because he perceives the defender to be reliable.
[544] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 225.

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A brief overview of the complex equilibria of the game: Completing the input of doctrines to the PDT-based model on deterrence with the chance of escalation by one or two of the players under incomplete information, the equilibria of the deterrence game(s) have been grouped by Kilgour and Zagare them in four separate deterrence categories: (1) Escalatory Deterrence Equilibria, (2) No-Response Deterrence Equilibria, (3) No-Limited-Response Deterrence Equilibria, and (4) Limited-Response Deterrence Equilibria (LRDE). At this point, the equilibria are only briefly introduced for a basic understanding.[545]

Under a deterrence equilibrium, the challenger never attempts to change the *status quo* and the defender never decides to escalate, both out of fear for nuclear escalation and thereby reaching a stable equilibrium. No-Response Equilibria and the three forms of No-Limited-Response Equilibria end either in escalation or no reaction at all, which related them directly to the 'Massive Retaliation' doctrine. The last category, LRDE consists of two variants, which both have drawbacks despite the chance to restrict the escalation potential of a deterrence game in favour of limited war. The No-First-Use Deterrence Equilibrium variant, the challenger cannot be deterred from issuing a threat in the beginning of the game, but the defender can extract a higher pay-off from that game, if he chose a hard posture. The second variant, called Warfighting Deterrence Equilibrium, requires the defender to be credible in both, respond-in-kind and escalation first.[546]

3.5.1 Game expansion I: Politico-military doctrines

The term 'doctrine' is probably one of the most iridescent words used in the military world and while it is abundantly mentioned in different military documents, the lack of a unified clear definition of what 'doctrine' actually means is quite surprising.[547] In order to shed some light on this illusive term, the starting point should be first of all a definition from the Merriam-Webster Dictionary, which provides a number of definitions for a 'doctrine'. Thereof, two are specifically relevant for the topic of this subchapter:

> "[…] b: a statement of fundamental government policy especially in international relations […]
> d: a military principle or set of strategies […]." (Merriam-Webster)[548]

[545] The equilibria are described in more detail under No. III in the Appendices.
[546] Zagare, F./Kilgour, D. M. (1995): Assessing Competing Defense Postures: The Strategic Implications of "Flexible Response", pp. 381-407; and: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 227 f.
[547] Curtis E. Lemay Center for Doctrine Development and Education (2020): A Primer on Doctrine, pp. 1 f., Hyperlink: https://www.doctrine.af.mil/Portals/61/documents/Doctrine_Primer/A%20Primer%20on%20Doctrine%208%20Oct%2020%20v2.pdf (Last visit: 24.01.2023).
[548] Merriam-Webster (n.a.): Definition of 'doctrine', Hyperlink: https://www.merriam-webster.com/dictionary/doctrine (Last visit: 24.01.2023).

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Politico-military doctrines represent an essential component of the national decision-making process in military alliances, because they represent the mutual agreement of the member states about the alliance's political goals and military level of ambition.

Posen distinguished (1) offensive doctrines that focus on the destruction of a rival's armed forces in war (for example through in a pre-emptive strikes or *blitzkrieg*) and (2) defensive doctrines that emphasise the protection of the alliance member states' territory. The existence of a doctrine provides orientation for national-decision-making on decisions to arm itself or pursue the development of a certain military technology. If a state knows the nature of a rival state's doctrine, he might initiate an arms race or seeking like-minded allies in order to deter the rival's doctrine in response. Politico-military doctrines can be made publicly available by a state in order to signal resolve to any other state in the international system, which is at the same time the very essence of general deterrence.[549]

In the scope of this dissertation, two specific aspects of politico-military doctrines need to be examined in more detail. The first one is the concept of the forward deployment of conventional forces and the second one concerns the deployment and use of nuclear weapons.

The *rationale* for the deployment of conventional forces derives from the Cold War era, where two military alliances were at loggerheads Doctrines regarding conventional forward deployment in central Europe; along the inner-German border and in the separated former German capital of Berlin to be more precise. Since the politico-military identity of the Western military alliance had evolved around defence, the respective member states had to prepare for any event that an incursion of the adversary's forces onto the territory of those states with exposed borders (especially Western Germany) had to be stopped as soon as possible in order to prevent the adversary to reach its expected war goals. The solution of the Western alliance was a dense network of military bases with allied troops (mainly from the U.S. but also from the UK) that would fight alongside the German national forces to halt any Warsaw Pact onslaught.[550] For the post-Cold War era, the justification of such forward deployments was obviously questioned in the troop-sending states that doubt if troops were still needed to deter a non-existent adversary. At the same time, the same pundits that wanted to see the troops returned wanted to see those states that benefitted from that decade-long deployment to invest more in their defence to compensate for any loss of deterrence and defence value arising from

[549] Posen, B. (2014): The Sources of Military Doctrine. France, Britain, and Germany Between the World Wars. Chapter 1 – The importance of military doctrines, pp. 13-16.
[550] Canby, S. (1978): European Mobilization: U.S. and NATO Reserves, pp. 233-242.

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the reduction or even halt of allied forward deployment.[551] Considering the issues of 'force thinning', which was presented in subchapter 2.1.3 and 3.1.2, permeate questions arising from any forward deployment of a military alliance, the empirically observable forward deployment posturing of the post-Cold War era are further examined in Chapter 4 under subchapter 4.1.1.

Doctrines regarding the deployment and use of nuclear weapons represent a subset of general military doctrines that form fundamental part of a nuclear-armed state's ins pursuit of military security in general and with a view to other nuclear-armed states. There are two important elements to these nuclear doctrines: (1) The political aspects, such as the declaration under which conditions nuclear weapons might be (credibly) used, e.g. a full-scale conventional and/or nuclear assault as the most extreme threat to the existence of the state", and (2) the military capability aspects, such as, *inter alia*, the scope of the national nuclear deterrent in terms of quantities and types of delivery systems, the command and control systems, and any deployment posturing.[552]

It is essential to understand that nuclear weapons have an inherent 'political role' due to their destructiveness for the targeted player, which emits serious exogenous effects, such as the spread of radiation indiscriminate of borders, the numbers of civilian mass casualties, economic sanctions by other third states due to morally unacceptable use of nuclear weapons by the player. In view of these conditions, and under the scenario of the integrated conventional/nuclear deterrence game of Chapter 3, wherein both challenger and defender are nuclear-capable, both states might consider the necessity to think for a moment, before deciding to escalate and thereby risking nuclear retaliation.

Since nuclear weapons remain at the national disposal of the state that owns them, the highest national authorities ultimately decide to release them for use. In the transatlantic alliance, however, the forward deployment of nuclear capabilities (i.e., nuclear sharing arrangements with non-nuclear allies) in allied state's national territories has been a fruitful and important long-time story and must therefore be particularly taken into account, when analysing NATO's military doctrines in conjunction with the third state Russia.[553]

Depending on the national decision-makers, the specification of the details surrounding the use of nuclear weapons can be formulated more or less vaguely; this is commonly called 'strategic ambiguity' and poses a positive risk for the challenger, because he cannot know exactly when

[551] Deni, J. (2012): The Future of American Landpower: Does Forward Presence still matter? The Case of the Army in Europe, pp. 1-17.
[552] Shankar, M./Paul, T. V. (2016): Nuclear doctrines and stable strategic relationships: the case of South Asia, pp. 2-6.
[553] Do Young Lee (2021): Strategies of Extended Deterrence: How States Provide the Security Umbrella, pp. 771-777 and p. 779.

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a specific action crosses the threshold for the release of nuclear weapons by the defender. However, it also poses a negative risk for the protégé, who cannot know, if the defender would rather escalate with tactical-nuclear weapons first in order to restrict the nuclear exchange to the theatre (in this case: Europe), while keeping his own territory out for as long as possible) at the expense of the European allies. And once, the nuclear threat might entail the defender's homeland territory, he could switch to a soft posture, thereby abandoning his protégé in the conflict.[554] In game-theoretic terms, and as introduced in subchapter 2.4., such a wedge strategy by a challenger against a military alliance can always be played, but the pay-off from separating the defender and protégé, when the potential of nuclear escalation comes into play, might be quite what the challenger hopes for.

Given that the transatlantic alliance agreed to discard the option of immediate unilateral nuclear escalation in form of 'Massive Retaliation' in the mid-1960s, the layered convention-to-nuclear response ladder, known as 'Flexible Response', became baseline for NATO ever since and stayed that way beyond the end of the Cold War.[555] It is fully rational for the defender to pursue such a more flexible approach and, the same vein, it is logical for the protégé to fear that the defender acts that way. Looking at the Cold War empirical evidence, the U.S. lost its unilateral nuclear threat credibility and was looking toward a new nuclear doctrine for its NATO commitment after the Soviet Union broke the U.S. monopoly on nuclear weapons' ownership and further advanced technology of delivery systems (e.g., intercontinental ballistic missiles (ICBM) with multiple warheads, space-based nuclear surveillance).[556]

Drawing upon Posen's distinction, Krell valued NATO's Flexible Response strategy as a defensive doctrine with offensive elements. NATO's doctrine was and remains not intended to conquer territory, but to restore the *status quo ante* of a conflict. At the same time, the doctrine foresees forward deployment instead of abandoning territory to build a defensive line in a rear area in the theatre of operations. Lastly, 'Flexible Response' encompasses further military elements, such as conventional forces in a tripwire function, whose destruction should trigger deliberate nuclear escalation, as well as the differentiated use of conventional, tactical-nuclear and strategic nuclear capabilities (the nuclear 'last resort' had been the core of NATO's

[554] Joseph, R. (1982): NATO and the Limits of Ambiguity, pp. 186-196.

[555] The change in the alliance's posture in response to the beginning post-Cold War environment was already initiated by the adoption of the fifth strategic concept, for reference, see: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natolive/official_texts_23847.htm (Last visit: 26.06.2022).

[556] Mets, D. (2010): Chapter 29 – The Age of Nuclear Parity, pp. 137 f. In: *Mets, D. (ed): A Companion for Aspirant Air Warriors: A Handbook for Personal Professional Study, 2010.*

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previous ‘Massive Retaliation’, but from the 1960s onward, NATO became literally more flexible and credible in its deterrence and defence posture).[557]

The assumption that the defender is nevertheless reliable in regard to the probability of joining the allied protégé is derived from the fact, that the defender and protégé are members of a formalised military alliance, which bases its structural integrity on a set of mutually agreed conditions, i.e., the 1949 North Atlantic Treaty. From earlier game iterations not further described (the Cold War era), defender and protégé have made experiences that inform current and future national decision-making at the nodes of the reiterative supergame. Thus, the positive experiences made by the protégé(s) on the nuclear-armed defender in the alliance should be sufficient to call upon the alliance’s support in the post-Cold War era as well, especially when the challenger issues a nuclear threat.

On the other side, the defender knows that he can only realise that his national political goals, such as military security, if he prevents another state from challenging the *status quo*. Provided that the defender favours a ‘Flexible Response’ doctrine with escalation option at a later node, he might likely favour conventional defiance first, whereby the protégé is able and expected(!)[558] to contribute to with own military forces.[559]

Following the comprehensive integration of military/nuclear doctrines into PDT under incomplete information, it should be noted that many research contributions on deterrence doctrines that cannot be covered in every detail. One exemplary case for such an addition has been the ‘Minimum deterrence’ doctrine that was employed by the nuclear ‘latecomer’ India[560], which is not further reviewed in the scope of this dissertation.

3.5.2 Game expansion II: Advances in military technology

Military technology is one of the key determinants for the capabilities of a deterrence and defence posture. When military equipment becomes obsolete due to age or newly developed military capabilities are introduced into the different branches of state’s armed forces, the capability of the posture becomes either incredible or remains credible.

Given that military technology in modern times is incredibly multi-facetted – just to name a few examples: satellite-based surveillance systems, automated drones, or high-precision guided

[557] Krell, G. (1986): The Controversy about ‘Flexible Response’, pp. 131-133.
[558] Empirical evidence for this expectation is the continuous 2% defence expenditure burden-sharing debate in NATO.
[559] Since escalation must not be the first resort of a deterrence game, the defender and protégé need to have a sufficiently large conventional force in order to be credible at defying. See: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 203.
[560] Lewis, J. (2008): Minimum Deterrence, pp. 38-41.

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ammunition – this dissertation focusses on the impact of ballistic missile defence (BMD) systems as part of a state's defensive arsenal to intercept and destroy incoming (potentially nuclear-tipped) ballistic missiles.

Considering the impact that a fully functional BMD could have on nuclear deterrence, this advanced military technology has already been analysed within the remit of PDT under incomplete information. Quackenbush has surveyed the U.S. national BMD system in terms of its role of deterring adversaries from conducting attacks with ballistic missiles against the U.S. In accordance with Quackenbush's theoretical evaluation, the existence of working BMD (i.e., $> 51\%$ "$to\ hit$" $chance$) increases the challenger's belief that the defender is hard and deterrence holds. Thus, "threat credibility" (Quackenbush) is the essential factor in the scope of PDT to allow general deterrence.[561]

The issue of a nuclear-armed challenger dissatisfied with the existing *status quo* should, however, not underestimated, when the role of BMD for nuclear deterrence is contemplated. The effects that an escalation damage-reduction capability of BMD of a defender exerts on the choice of his own posture is quite fundamental. Translating the benefit for the defender in game-theoretic terms:

Challenger: $$-(k_C + d_C) \quad (35)$$

Defender: $$-(k_D + (1 - e)d_D) \quad (36)$$

The cost of an all-out war for the challenger consists of the individual costs incurred from conventional plus nuclear component of the war. The defender suffers the conventional costs plus a discount of the costs from nuclear war; the discount depends on the success rate ("to hit") of the BMD system.

Logically, if BMD effectivity e increases, so does the dissatisfaction of the challenger, who fear decreased defender's vulnerability if challenger decides to escalate, while challenger can still suffer the full effect of nuclear retaliation. Quackenbush and Drury tested this theoretical argument empirically for U.S. BMD and several other nuclear powers, *inter alia*, Russia, and in their research model, they found no evidence that U.S.-Russia relations have been negatively affected. It must be stressed that the research design consists of a rather weak data basis (i.e., datasets on diplomatic relations as well as UN voting data; timeframes: 1985-2004/1985-2008). In that sense, Quackenbush and Drury rightly mentioned that further empirical analyses might be necessary. In response to both researchers, the case study on NATO's deterrence and defence posture is conducted in the upcoming Chapter 4.[562]

[561] Quackenbush, S. (2006): National Missile Defense and Deterrence, pp. 536 f.
[562] Quackenbush, S./Drury, A. C. (2011): National missile defense and (dis)satisfaction, pp. 471-473 and 478 f.

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3.6 An operative interpretation of the game and the game outcome

The integrated conventional/nuclear deterrence game as developed and extended throughout subchapter 3.5 is a product of multiple sources.

(1) The core tenets of PDT were introduced in subchapter 3.2, t
(2) he game parameters were presented in subchapter 3.3,
(3) Quackenbush's three-player partial conventional deterrence game was displayed in subchapter 3.4.1, while
(4) the partial nuclear game was generated from the logical application of Quackenbush's partial conventional game and, *inter alia*, combined with Zagare's and Kilgour's seminal book 'Perfect Deterrence Theory'.

The problem of very game from game theory is the question of the game resolution. Taking into account that the integrated conventional/nuclear deterrence game is based on the condition of incomplete information and that Quackenbush's three-player conventional game[563] already has 14 equilibria[564] which represents only one part of the game in subchapter 3.5, a simplified approach is required.

This subchapter proposes an alternative approach that is derived from the logical interpretation of (1) the players' basic intentions in the game (rationality), (2) the player's characteristics (credibility and capability), (3) the interaction of the two players at a given node, and (4) the subsequent outcome of that interaction.

Assuming the player knows his preference in accordance with the prioritisation of the game results per player given in subchapter 3.5. The game results are based on a value. Each player determines the specific value of a result for himself. The pay-off is connected to a specific posture. The higher the pay-off, the more robust will the player pursue that option. On the other side, if the pay-off is low, it is assumed that the player would rather 'cut his losses' instead of continuing upon a costly course.

Value	++	+	0	-	--	---
Pay-off	Very high	High	Indifferent	Low	Very low	Prohibitively low
Posture	Hard	Hard	Hard/Soft	Soft	Soft	N/A

Table 13: Definition of a pay-off matrix for the players of an integrated conventional/nuclear deterrence game

[563] Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 565.
[564] The table with all 14 Perfect Bayesian Equilibria and their existence conditions can be found under No. I the Appendices.

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There are two specific occurrences in that linear model. Firstly, a zero-value outcome puts the player into a position, where he is merely indifferent in his priorities. Examples for such a case might be the game constellation, where an allied player is unreliable and does not partake in a conflict. Secondly, prohibitively low pay-off can only be achieved when two nuclear-armed players engage each other in a mutual nuclear war. Regardless if the protégé has decided to participate or not in the conflict, he is also heavily impacted because it is assumed that he might become a target by the challenger in such a war as well.

In the Tables 14, 15, and 16 below, the standardised pay-off matrix has been applied on the comprehensive set of preferences that all players have.

The pay-off from the *status quo* reflects the negative pay-off for the challenger and the reason of creating a threat posture, while defender and protégé profit from the as-is situation of the *status quo*. Considering the relevance of the *status quo* for solving the game as a whole, the distribution of the pay-offs that favour the defender and protégé derive from the outcome of the Cold War. While their former adversary, particularly the Soviet prime successor state, had to recover from internal crises (for example, the transformation to a democratic market economy or internal extremist violence in Chechnya) and external shocks (e.g., due to the loss of territory because national independence movements in the Baltic states, Belarus, Ukraine or in Central Asia), NATO's member states were able to benefit from the so-called 'peace dividend' to cut defence expenditures.

Furthermore, the political conditions following the 1975 Helsinki Final Act as well as the 1990 'Paris Charter for a New Europe' that allowed its signature states the freedom of choice regarding alliance memberships provided the basic ingredient that made Russia a natural challenger of the *status quo* in the Euro-Atlantic region.[565] For theoretic accuracy, one might argue that Russia was not responsible for the change of the *status quo* in the 1990s, but it was NATO that has enlarged towards Eastern Europe and had thereby revised the *status quo*. Considering the political context from the international treaties (1975 Helsinki Final Act and 1990 Paris Charter), a change of the *status quo* on the basis of mutually agreed international

[565] For completeness, it should be mentioned that the 1997 NATO-Russia Founding Act reiterated the commitment of both signing sides (NATO and Russia) to the principles of the 1975 Helsinki Final Act that provided the basis for states to sovereignly choose their alignment. Regardless of the legal foundations that enabled the NATO accession of former Eastern bloc states or the wording in the different agreements, which might allow different legal interpretations, NATO enlargement was and remains definitely a politico-military problem for Russia. See: Deutscher Bundestag/Wissenschaftliche Dienste (2022): Zum Recht auf freie Bündniswahl – Rechtliche Positionen und Handlungsoptionen im Ukraine-Konflikt zwischen der NATO, Russland und der Ukraine, pp. 4-14, Hyperlink: https://www.bundestag.de/resource/blob/883042/599faf6416c98acd74694964e6ac2b7e/WD-2-007-22-pdf-data.pdf (Last visit: 25.01.2023).

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law should not be considered a threat challenge in the scope of the integrated conventional/nuclear deterrence game.

In this sense, Russia could considerably improve its pay-off by challenging either protégé or defender. If, however, the challenger must retreat, because the alliance between the defender and protégé has held, he might not only lose his pay-off from the status quo but receive a further penalty by the defender and protégé in order to dissuade the challenger from issuing a threat again.

If the protégé concedes in response to the challenger's initial threat at the first node or at a later stage, the pay-off for the challenger is high, while the defender's negative pay-off would only materialise, if he joined the ally and could not tip the balance in favour of the protégé.

On the other side, if the defender concedes at the challenger's initial threat, the challenger might gain the best outcome. If the protégé took part and the defender conceded, the likelihood of the protégé continuing the conflict is assumed to be low. Hence, an allied protégé would also loose from the defender's concession, but with a varying degree: If the defender was unreliable, the protégé might suffer less in comparison to a scenario when the protégé joined his ally.

	Status Quo	Challenger retreats	Protégé concedes	Defender Concedes
Challenger	-	--	++	++
Protégé	+	++	--	-- *or* - (when unreliable)
Defender	+	++	- *or* 0 (when unreliable)	--

Table 14: Pay-off distribution for each non-conflict solution per player

Assuming that the protégé and/or defender decide to defy the challenger's threat, the following pay-offs that lead to different kinds of war would be the resulting outcome of the game. It should be noted that the last outcome displayed, namely nuclear war, has a unique outcome: Due to the massive destruction caused by a nuclear exchange between challenger and defender (without any thought about who started the war) leads to prohibitive costs and therefore the pay-off is defined as prohibitively low. This would make nuclear escalation at least from this empirical operationalisation's point of view very unlikely.

In contrast to that all destructive outcome, bilateral war between challenger and protégé might be most beneficial for the challenger, because he could threaten nuclear escalation at any time while the protégé can then only concede or suffer unilateral destruction. Bilateral war between challenger and defender might provide a higher pay-off, but it is outweighed by the risk to engage a nuclear-armed defender. Multilateral war would clearly benefit the military alliance

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and particularly the weaker protégé, thus from all war outcomes, this option would provide the military alliance with the best pay-off.

	Bilateral War Challenger-Protégé	Bilateral War Challenger-Defender	Multilateral War	Nuclear War
Challenger	+	+	--	---
Protégé	--	0	+	---
Defender	0	-	+	---

Table 15: Pay-off distribution for each conflict solution per player

Lastly, following the final game pay-offs from concession/*status quo* and the pay-offs from the various conflicts, the interim-pay-offs for the challenger and defender in case of nuclear escalation are briefly examined. A challenger's nuclear escalation against a non-nuclear protégé is the best option, because the protégé cannot defy without suffering unilateral destruction. A challenger's escalation against the defender is his second-best option, because it is always preferable to be first mover in the threat for nuclear escalation than the responder. The situation picture is vice-versa, when the defender decides to escalate first. In case that the defender escalates on behalf of the protégé, because the challenger issued a threat against the protégé first, the protégé receives the highest pay-off due to the defender's reliability regarding its commitment to the alliance and because the protégé cannot issue a nuclear threat himself.

	Challenger escalates against Protégé	Challenger escalates against Defender	Defender escalates against Challenger (national decision)	Defender escalates against Challenger (alliance commitment)
Challenger	++	+	--	--
Protégé	--	0 *or* – (when unreliable)	+ *or* 0 (when unreliable)	++
Defender	-- *or* 0 (when unreliable)	--	+	+

Table 16: Pay-off distribution for each conflict escalation interim-solution per player

Given that game-theoretic approaches work with equilibria in order to identify potential combinations of game resolutions. At this point, it should be recalled that Quackenbush's three-player game offers a total of 14 cases of Perfect Deterrence Equilibria.[566] Given that such a complex PBE structure is difficult to examine from an empirical perspective, this dissertation takes a more simplified approach and makes use of four basic PBE that Zagare and Kilgour provided in their original work on PDT for a unilateral deterrence game under incomplete

[566] Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 574.

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information. These equilibria are called (1) Certain deterrence, (2) Steadfast deterrence, (3) Separating deterrence, (4) Bluff deterrence, and (5) Attack deterrence.

The equilibria (1) to (4) lead to the retention of the *status quo*, because the challenger might not be willing to issue a threat or he might be willing to do it, but does not have sufficient credibility. The strongest outcome of a game is 'Certain deterrence', wherein the *status quo* depends on the robustness in terms of posture and credibility of the alliance; the challenger's posture can be hard or soft and his threat credible or not. In the 'Steadfast deterrence', the defender's credibility is not high enough that the challenger's posture and threat do not matter, but the defender's credibility in conjunction with the protégé is high enough that the military alliance deters the challenger from issuance a threat to change the *status quo*. In comparison, the 'Separating deterrence' rests on the combination of player's preferences. If challenger is hard and the other is soft and reliable or unreliable, the most likely outcome is preferable to the challenger. When the challenger pursues a soft posture and the other side is hard and reliable or unreliable, the military alliance tilts the equilibrium most likely in its preferred direction. In the 'Bluff equilibrium', the posture of no player matters, because any player's credibility is low. At the most extreme side of the spectrum, the 'Attack equilibrium' gives all advantages in terms of hard posture and high threat credibility to the challenger, while the military alliance's posture and credibility in terms of retaliation is low.[567]

In a nutshell, all equilibria depend on a combination of posture, which is either hard or soft, and the extend of the credibility of the threat challenger and respective retaliation by individual protagonist of the military alliance. It should be stressed that the below interpretation was designed in a simplistic manner, since the thresholds that form an important part in separating the different equilibria in PDT depend on the quantification of the individual priorities of each player throughout the deterrence game.[568]

The first table below shows a game, where the challenger issues a threat against the defender and the protégé only comes into play, when his commitment for the alliance is reliable. It is important to underline that the game situation below reflects the situation at the last node of the game, when the game is about to be solved.

		Challenger posture	*Defender posture*	*Protégé alliance reliability*	*Protégé posture*
1	Certain Deterrence	Not important	Hard	Reliable	Hard

[567] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 144-158.

[568] Kim Chong Woo (2020): Implications of Perfect Deterrence Theory for South Korea, pp. 32 f., 37 f., and 43 f., Hyperlink: https://en.asaninst.org/wp-content/themes/twentythirteen/action/dl.php?id=50362 (Last visit: 29.10.2022).

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2	Steadfast Deterrence	Hard	Hard	Reliable	Hard or Soft (Inconclusive)
3	Separating deterrence	Hard	Hard or Soft (Inconclusive)	Reliable	Soft
4	Bluff deterrence	Soft	Soft	Reliable	Soft
5	Attack deterrence	Hard	Soft	Unreliable	Not important

Table 17: Game situation at the last node of the deterrence game, when the challenger has issued a first threat against the defender

The second table views the situation vice-versa, when the challenger issues a threat against the protégé first and the defender only comes into play, when he is reliable in his commitments towards his ally:

		Challenger posture	*Protégé posture*	*Defender alliance reliability*	*Defender posture*
1	Certain Deterrence	Not important	Hard	Reliable	Hard
2	Steadfast Deterrence	Hard or Soft (Inconclusive)	Hard	Reliable	Soft
3	Separating deterrence	Hard	Hard or Soft (Inconclusive)	Reliable	Hard or Soft (Inconclusive)
4	Bluff deterrence	Soft	Soft	Reliable	Soft
5	Attack deterrence	Hard	Soft	Unreliable	Not important

Table 18: Game situation at the last node of the deterrence game, when the challenger has issued a first threat against the protégé

Summarising the operationalisation of credibility and capability, a qualitative element, such as high-level strategic documents and deterrence-related formal press communications, as well as quantitative aspects, i.e., the national conventional military capabilities of a military alliance's member states as well as a specifically identified third state own, are further used in regard to hypothesis-building and the subsequent empirical analysis. Considering that the world entered the so-called nuclear age from 1945 onward and in face of NATO as well as Russia being closely interlinked with nuclear weapons, these particular military capabilities require more detailed examination.

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3.7 Conclusion of the integrated convention/nuclear deterrence game design

The central aim of Chapter 3 was the creation of the game-theoretic framework as the theoretical foundation of the empirical analysis of Chapter 4.

As a starting point, the core elements of the PDT (credibility, capability and rationality) were presented comprehensively in subchapter 3.2. Then, the structural game parameters were defined in subchapter 3.3 based on an outline of the different elements of anextended, general, unilateral, conventional, and nuclear deterrence game.

Then, two base games were introduced in subchapter 3.4 that led to the development of the eventual integrated convention/nuclear deterrence game. These two base games consist of the pure conventional deterrence game from subchapter 3.4.1 and the pure nuclear deterrence game from subchapter 3.4.2. Each of the pure games covers only one component of the full integrated game as presented in subchapter 3.5, namely the conventional and a nuclear element.

While the pure conventional simply introduced the three-player PDT game model of Quackenbush, the brief nuclear subgame was developed on the basis of the logical derivation from the previous pure conventional game by Quackenbush and further informed by the contributions of other PDT researchers, such as Zagare and Kilgour. The core of the efforts for the subgames was the following integration into a large game in subchapter 3.5.

In subchapter 3.5, the core game-theoretic contribution of this dissertation – the integrated conventional/nuclear deterrence game – was developed on the basis of Quackenbush's three-player model with a challenger, a protégé and a defender and with a nuclear option for the challenger and defender due to their nuclear arsenals. The integrated conventional/nuclear deterrent game was further expanded by minor modifications in subchapter 3.5.1 and 3.5.2, thereby adding some limited dynamics in the policy strategies of the players in the game. These dynamics come from the inclusion of political-military doctrines that play a central role key instruments/document for the credibility or capability of the respective player. Furthermore, new developments in military technology (ballistic missile defence) can also affect the game in terms of the credibility or capability of the players (e.g., in the question of strategic (nuclear) balance).

Lastly, in view of the complexity of the integrated conventional/nuclear deterrent game (Quackenbush's pure conventional game already identifies 14 equilibrium states), subchapter 3.6 provides simplified approach. Assuming the game has arrived at a juncture after the opening of the challenge, players identify their respective game strategies (hard, soft, inconclusive) in the context of a general game of deterrence. The combination of these postures is evaluated along a simplified form of the five most common equilibrium states used in the PDT.

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Chapter 4: The game-theoretic analysis of NATO's deterrence and defence posture in the post-Cold War era (1992-2016)

In Chapter 2 of this doctoral thesis, the conceptual and theoretical foundation were laid for examining case studies relating to an extended general unilateral conventional and nuclear deterrence game between a military alliance that consists of a nuclear-armed defender and conventionally-armed protégé on one side as well as a nuclear-armed third state challenger on the other.

In Chapter 3, a game-theoretic framework based on a combination of two work strands of PDT – a three-player unilateral conventional deterrence game and a unilateral nuclear deterrence game that enables specific states the option of nuclear escalation – was comprehensively developed.

In the following Chapter 4, the aims are twofold: (1) The transformation of the theory into an applicable and operationalised 'instrument' for the analysis of a specific case, and (2) the validation of the hypotheses, which were presented in subchapter 3.2. The first aspect is addressed in subchapter 4.1, which provides a theoretically sound and structured approach.

In subchapter 4.2, this dissertation offers a brief introduction to cooperative security frameworks, which had considerable influence on the players' capability 'landscape' with a special emphasis on mutual reductions of conventional arsenals and nuclear stockpiles.

The subchapters 4.3, 4.4, and 4.5 then offer an in-depth analysis of each individual player of the integrated conventional/nuclear deterrence game.

It should be stressed that Chapter 4 is not intended as a full historical account of NATO-Russia relations or 'Russia-Western' cooperation[569] and frictions[570] in the timeframe 1992-2016. It provides a focussed review of the critical junctures of each player for the initial moment after the Cold War, the first and second decade thereafter.

[569] For example, the Russian-U.S. security cooperation following the 9/11 terrorist attacks on the U.S., which was apparently based on rather short-term motives and ill-fated hopes of Russian thinkers to get Russia at eye level to the U.S. in regard to the acknowledgement of Russian foreign and security policy positions. See: Stent, A. (2021): The impact of September 11 on US-Russian relations, Hyperlink: https://www.brookings.edu/blog/order-from-chaos/2021/09/08/the-impact-of-september-11-on-us-russian-relations/ (Last visit: 04.10.2022).

[570] An example of a Russian act of defiance against NATO has been the already mentioned incident of Russian Airborne troops taking Pristina International Airport before NATO troops could arrive. See: Heller, R. (2014): Russia's quest for respect in the international conflict management in Kosovo, pp. 338-342.

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4.1 From theory to empirics

Before any game-theoretic analysis of NATO's deterrence and defence posture for the post-Cold War era can take place, the game-theoretic framework as presented in Chapter 3 must be first of all translated into an applicable operationalised approach, wherein abstract variables, pay-offs or equilibria become aligned with concrete decisions and actions of the states in the international system.

Given the empirical focus on the Euro-Atlantic region, the military alliance under scrutiny is NATO *also known as* the transatlantic alliance. The nuclear-armed defender that is a member state of the alliance is identified as the U.S., while basically any other non-nuclear member state could be chosen as the protégé. Taking into account that the research question concerns the deterrence and defence posture of the whole military alliance, an individual member state as protégé would not suffice, because the alliance-wide posture is determined on the basis of unanimity by all member states of the alliance. Given that the analysis of 16-28 individual member states' foreign, security and defence policies regarding NATO would be too complex to achieve in the scope of this dissertation, the NATO 'collective' of states that encompass all member states of NATO (including the defender) at a given time has been selected as the protégé. The special role of the nuclear-armed defender would be limited to the provision of its nuclear deterrent to the military alliance.

Furthermore, given the importance of adjacency in territorial borders between an alliance and the threat[571], the most likely applicant for the position of politico-military challenger in a general deterrence-related game due to his large conventional and nuclear arsenals has been and continues to be one of Europe's non-NATO third states, namely Russia.[572]

Having established a competing or rival power for NATO, the question of measuring deterrence follows the conceptual foundations of PDT in line with subchapter 3.1.2.

[571] This is fully compliant with the theoretical assumption of a 'weakest-link' from Hirshleifer, which addresses the need of a military alliance to protect exactly that territory, which is particularly exposed to non-allied neighbouring states. See: Murdoch, J. (1995): Chapter 5 – Military Alliances: Theory and Empirics, pp. 98 f. In: *Sandler, T./Hartley, K. (eds.): Handbook of Defense Economics, vol. 1.*

[572] This does not mean that other potential state actor threats are irrelevant. For example, Serbia (ex-Yugoslavia) has been a very relevant actor for immediate deterrence scenarios as a lesson learned since the Balkan Wars of the mid-1990s. This does however refer 'pivotal deterrence', wherein a military alliance intends to deter two sides locked into crisis with each other from moving towards military action. For reference on the case of Kosovo, see: Crawford, T. (2002): Pivotal Deterrence and the Kosovo War: Why the Holbrooke Agreement Failed, pp. 499-504.

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4.1.1 Hypotheses

On the basis of the integrated conventional/nuclear deterrence game as presented in subchapter 3.5 and with consideration to the research question of this dissertation in subchapter 1.3, three hypotheses were derived and shall hereby be presented and explained in more detail.

Recalling that the game under examination entails three players, namely a challenger, a military alliance consisting of the protégé and conventional side of the defender, and a nuclear-armed defender who is a member of the alliance but addresses his role regarding the extended nuclear deterrence to the alliance in a separate capacity. Each of the player is to receive its own hypothesis as per below.

Before going into these details, it is necessary to define several conditions and assumptions. First of all, all player is part of the integrated conventional/nuclear deterrence game based on incomplete information. Furthermore, it is assumed that the challenger is disadvantaged by the *status quo*. Therefore, he is motivated to attempt a change in order to accommodate his (military security) interests. Furthermore, it is assumed that the game starts in the initial post-Cold War era, wherein all states need to first and foremost settle in the new politico-military environment, where the challenger has just lost the unitary threat posture together with his military alliance (Warsaw Pact/Soviet Union). The protégé and defender on the other side see the new geopolitical environment as a promising political, social, and economic opportunity, hence both would see that this state of affairs in the international environment continues to persist.

At some point, the challenger is disadvantaged by the *status quo*, whether due to his own national ambition or some outside factor does not matter at this point. While the *status quo* thus benefits the defender and protégé, the challenger does not. In this political-military context, it is assumed that overtime:

> **Hypothesis 1**: The challenger establishes a credible and capable threat posture in order to force the defender and protégé into an immediate deterrence situation through which the challenger hopes to gain the desired change of the *status quo*.

On the other side and under the assumption of incomplete information, the defender and protégé are not aware of the challenger's consideration regarding the *status quo*. As of the beginning of the game, both players do not define the challenger as the unitary military threat. In this politico military context, it is assumed that over time:

> **Hypothesis 2**: The military alliance consisting of a protégé and conventional side of the defender decrease the military alliance's deterrence and defence posture in terms of credibility and capability to a minimum that corresponds alliance's agreed minimum military security requirement.

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Hypothesis 3: The nuclear-armed defender who is the decisive guarantor of the extended nuclear deterrence inside the military alliance decreases his nuclear commitment to the military alliance in terms of credibility and capability.

With the validation of these three hypotheses on the basis of the empirical analysis in Chapter 4, an answer to the research question from subchapter 1.3 can be formulated in regard to the impact of a missing common politico-military threat that unified NATO throughout the Cold War.

4.1.2 An empirical interpretation of the player characteristics: Credibility, capability, and rationality

As stressed in subchapter 3.1.1, credibility, capability, and rationality represent the main pillars of PDT and are therefore key indicators that determine if a threat issued by the challenger or the deterrent by the defender/protégé are credible and capable.[573]

The main source for a player's credibility: Cases of unilateral deterrence as examined in this dissertation encompass a military alliance consisting defender and protégé that want to retain the status quo by deterring any challenger to attempt a change by issuing a threat against defender and/or protégé. A key factor for the military alliance to achieve that goal is to undergird their deterrence posture with credibility. In line with the instrumental rationality axiom that PDT is based upon, the two key authors of the theory proposed that

> "[…], we define threat credibility as the extent to which a threatener is seen to prefer to execute the threat (should the appropriate contingency arise). […] Like other instrumentalists, we assume that an actor prefers to execute a threat when the anticipated worth of doing so exceeds the anticipated worth of failing to do so. Otherwise, the threat is irrational and, hence, incredible." (Zagare/Kilgour)[574]

Only a credible deterrence posture can deter the challenger from issuing a threat. Under the condition of incomplete information and in a general deterrence setting, it is vital for the military alliance to signal the credibility of the alliance's deterrence and defence posture towards any challenger, regardless where he comes from.[575] On the other side, a challenger might at the same time also want to signal is willingness to question the *status quo* in a general deterrence scenario without actively launching a specific crisis (which would then become a case of immediate deterrence).

[573] This is fully in line with the reciprocally requirement for a credible deterrence, see: Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 289 f. and p. 296.
[574] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 67 f.
[575] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 143 f. and pp. 164 f.

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For this purpose, both players can publicly disseminate high-level strategic documents that contain their individual perspectives on the politico-military context that both operate in militarily. Such high-level strategic documents offer not only broad insight in the intentions and aims of national and multinational foreign and defence policy but also represent strong signalling activities by which states disclose their intentions (either honest one's or as a stratagem intended to disinform potential rivals). Conceptually, a high-level strategic document

> "[…] answers questions about how to deal with competitive situations or challenges in an uncontrolled environment. […] Strategy can also be described as an approach to achieve a policy objective. Strategy as an approach is also synchronous with the idea of strategy as process that leads to a synthesis of ideas." (Neill *et al.*)[576]

For the purpose of using such documents in the scope of the integrated conventional/nuclear deterrence game, high-level strategic documents are defined as (1) formal written document, which are (2) the product of a comprehensive thematical orientation, opinion-seeking and inter-departmental draft negotiation process at the highest level(s) of national decision-making, and (3) that were formally adopted by the relevant political authorities of that state (i.e. heads of state/government, ministers of foreign affairs and/or defence) in order to be executed as official national policy. Examples of such national documents of strategic politico-military relevance are national security strategies, national military doctrines, strategic concepts for a military alliance, and comparable works.

The main source for a player's capability: Military capabilities represent an essential aspect of deterrence. There are two conditions that must hold: (1) A state must have the physical capabilities (e.g., quantities of military equipment and personnel) in order to either pose a credible threat as challenger as well as a credible deterrent as defender or protégé, and (2) the usage of those capabilities needs to exert a negative impact on the target, when an announced threat or deterrent is executed.[577]

For measuring military capabilities, PDT draws upon the classical set of between conventional capabilities (i.e., battle tanks, fighter aircraft, etc.) and nuclear capabilities (i.e., heavy bombers, submarines and land-based missiles equipped with nuclear warheads).[578]

In order to fully exploit military capabilities in quantitative analyses, some form of benchmark must first of all be established for a robust comparison of capabilities between the challenger

[576] Neill, M./Taliaferro, A./Tillman, M./Morgan, G./Hinkle, W. (2017): Chapter 1 – Defense Policy and Strategy, p. 2. In: Neill *et al.* (eds.): Defense Governance and Management: Improving the Defense Management Capabilities of Foreign Defense Institutions. *Institute for Defense Analyses, Hyperlink: https://www.jstor.org/stable/pdf/resrep22899.4.pdf (Last visit: 31.10.2022).*

[577] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 81-82.

[578] Quackenbush, S. (2011): Deterrence theory: where do we stand?, pp. 751 f.

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as well as defender and protégé in order to being able to identify the state of deterrence existing in a given theatre.[579] Karber and Combs pointed out that ratios tend to reflect the experiences made by each nation's military planners from previous conflicts on the one hand such and on the other that the ratio requires further refinement, such as the distinction between winning a battle through local concentration of one's own forces in order to gain overwhelming advantage and having sufficient capabilities at one's disposal in the whole theatre of operations in order to being able to achieve operational success.

Conventional capabilities are the baseline of armed forces of almost any state today.[580] In this sense, Karber and Combs attributed the ratio of $1-1.5:1$ for the defender in a theatre of operations as benchmark for NATO in the Cold War era; relatively modest in comparison to Soviet ratio calculations, which foresaw far higher ratios required for the challenger in order to secure success against the against the defender.[581]

In regard to nuclear capabilities, Steinbruner identified several capability-related requirements that nuclear weapons must fulfil in order to establish a strategic stability between two or more nuclear-armed states: (1) an adequate number of strategic launchers, (2) with a potential number of independently targetable warheads in those launchers, (3) the respective launcher's accuracy to hit, (4) minimum target precision in line with the nuclear doctrine, and (5) level of the target's hardening to resist the effects of the nuclear explosion(s).[582]

Based on Kahan's suggestion on categorising weapon systems, Gray further enriched the insight on nuclear weapons as enablers strategic stability. In this sense, the number of nuclear weapons as per Steinbruner do not (only) matter, but also their specific technical properties. Gray went on and defined, inter alia, different types of weapon systems to a point as stabilizing, whereas other types – amongst them 'area ballistic missile defence' – could be considered as destabilising.[583] The challenge of BMD as a form of military technology advancement, which influences the deterrence game for both players was addressed in subchapter 3.4.5 and is furthermore empirically explored by examining the impact of BMD on the defender's and challenger's nuclear deterrence credibility.

[579] Mearsheimer, J. (1989): Assessing the Conventional Balance: The 3:1 Rule and Its Critics, pp. 54-57.
[580] Few states do not employ own national military forces. For further information on one such state, namely NATO member Iceland, see: NATO (n.a.): Iceland and NATO, Hyperlink: https://www.nato.int/cps/en/natohq/declassified_162083.htm (Last visit: 12.11.2022).
[581] Karber, P./Combs, J. (1998): The United States, NATO, and the Soviet Threat to Western Europe: Military Estimates and Policy Options, 1945-1963, pp. 421 f.
[582] Steinbruner, J. (1978): National Security and the Concept of Strategic Stability, pp. 413- 415 and pp. 421-425.
[583] Gray, C. (1980): Strategic Stability Reconsidered, pp. 146-149.

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The main source for a player's rationality: The third criterion of rationality, as described in subchapter 3.2, is an inherent part of the prioritisation of each player's preferences, which also influence the individual players' credibility. In the words of Kilgour and Zagare,

> "[C]redible threats are threats that are believed; threats can be believed exactly when it is rational to carry them out; thus, only rational threats are credible threats." (Zagare/Kilgour)[584]

Subsequently, the order of preferences given for the three players – challenger, protégé and defender – value the different possible outcomes from a game. If a player's set of beliefs indicate that a rival player prefers conflict over concession, the rival player communicates a credible threat.

So, whenever one policy strategy out of two choices are taken at any node of the integrated game the choice already reflects a rational evaluation of the potential game results as a consequence of the individual choices by the active player.

In accordance with Zagare and Kilgour, rational behaviour of each individual player

> "[…] depends on two kinds of information: a player's own preferences and its beliefs about its opponent's preferences." (Zagare/Kilgour)[585]

For the two authors, the last decision node of the game tree requires special attention, because at this point of the game, the respective active player must decide, if he wants to pursue a hard or soft posture versus the other player(s). A hard player would always choose war over concession, while the soft player would do vice-versa. It should be noted, that the actions decisions taken by the players inform each other through updating. Therefore, a defender or protégé might view the challenger as hard at node 1, because he defies from the status quo, while the challenger cannot know at the later node, if the defender or protégé pursue a hard posture as well, thus leading to a conflict that might not be the preferred outcome of the challenger.[586] In a game of general deterrence, the decision at the last node of the game tree does not necessarily represent one of 'peace or war' because general deterrence is not (!) an immediate deterrence crisis. Therefore, and in a nutshell, a hard player would not choose war in the general deterrence game at the last node, but the decision to launch an immediate deterrence challenge (e.g., crisis or potential threat for conflict).[587]

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[584] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 66 f.
[585] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 143.
[586] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 143 f.
[587] Mazarr, M. (2018): Understanding Deterrence, pp. 2-4, Hyperlink: https://www.rand.org/content/dam/rand/pubs/perspectives/PE200/PE295/RAND_PE295.pdf (Last visit: 07.06.2022).

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While measuring credibility in an immediate deterrence setting is easier and more straightforward to achieve (since two or more player directly interact with each other in a crisis or emerging conflict), general deterrence needs a less granular approach for the analysis. Recalling that the intention of general deterrence is to deter any potential challenger from issuing a challenge or threat against the protégé and defender[588], the military alliance's member states are required to communicate their intentions towards non-member states that basically constitute the 'pool of challengers', from which the next potential rival can come from. Given that the group of non-member states is rather large and diverse, the alliance member states need to unanimously agree (in the case of NATO) on the direction of their joint deterrence and defence posture and communicate that to the public in order to signal their resolve towards those states that the intended receivers.

4.1.2.1 The analysis of credibility with qualitative methods

The transformation of the players' credibility into an operational conclusion is not a minor issue as it puts the author in a position similar to that of a player in the game: Given that each player knows their own characteristics and priorities, they are limited in their knowledge about the intentions of the other players; hence, every player has only a set of beliefs about the other players' credibility.[589]

For simplicity, the following assumptions are taken into account: (1) The defender and protégé have a mutual advantage in regard to their individual characteristics and priorities through the communication channel that is offered by the military alliance that both are member states of, (2) the defender's 'private' information is mainly restricted to the specific role that he performs for the military alliances, i.e., the provider of the nuclear deterrent, and (3) all players have a vested interest in communicating their posture before or at a given node in order to influence the choice of the active player at that node.

Especially the communication of a player's interests to the other players of the game is an important element on the national pursuit of military security. It is therefore assumed that such communication efforts by each player contain more than a marginal amount of credibility in them. If that was not the case, the other players would stop believing the statements made by the player and subsequently simply defy any general threat by the challenger. Moving from purpose to form of the communication, the players can employ a wide range of politico-military instruments that include, *inter alia*, political statements in the mass media, addressal of the issue

[588] Quackenbush, S. (2011): Deterrence theory: where do we stand?, pp. 752-754.
[589] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 143 f.

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of concern in bilateral or multilateral fora, or even extended military exercises as a show of force in the vicinity of a neighbouring state.

In order to enable the examination of such channels of communication for the purpose of identifying a player's credibility, a content analysis in accordance with McLacity and Janson provided the simplest but robust approach. In this sense, the following practical steps were required: (1) The identification of the relevant texts, (2) definition of evaluation criteria to be applied on the texts, (3) factual evaluation, and finally (4) review the hypotheses through empirical cross-reference.[590] In this subchapter, the numbers (1) and (2) were provided, while (3) and (4) were reserved for the actual empirical analysis and conclusion.

In the scope of this dissertation, which does not focus only a singular crisis but rather a timeframe of 1992-2016, the main instrument of such communication had to carry a certain 'weight' in terms of robustness and continuity. As a consequence, high-level politico-strategic documents, such as military doctrines, strategic concepts, and similar official documents published by NATO, Russia, and the U.S. were taken as the key documents for the analysis.

There had to be some administrative criteria for a document to be taken into account in this doctoral thesis: These documents had to be publicly available, i.e., of a non-classified nature, and for Russian documents provided least in an English translation.

And as an additional general administrative remark for Chapter 4 at this point, certain text quotes from high-level strategic documents were highlighted in '**bold**' in order to underline a significant influence of these statements on the on the game-theoretic setting between the NATO, Russia, and the U.S.

Given that there are numerous documents, a careful selection had to take place to arrive at a thorough analysis without being overwhelmed by the masses of information provided in such documents. The following triple of documents were chosen as the core for each player's credibility (their specific purpose and format are explained in more detail in the subchapters of the player's credibility):

[590] McLacity, M./Janson, M. (1994): Understanding Qualitative Data: A Framework of Text Analysis Methods, p. 143.

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Timeframe	*Russia*	*NATO*	*U.S.*
Initial post-Cold War era	1993 Military Doctrine	1991 NATO Strategic Concept	1994 Nuclear Posture Review
After the 1st decade of the post-Cold War era	2000 Military Doctrine	1999 NATO Strategic Concept	2002 Nuclear Posture Review
After the 2nd decade of the post-Cold War era	2010 Military Doctrine	2010 NATO Strategic Concept	2010 Nuclear Posture Review

Table 19: Selection of core high-level strategic documents of Russia, NATO, and the U.S. [own description]

The nature and dates of the documents presented above show a certain (more or less intentional) alignment in three timeframes:

The first document of every player reflects the initial post-Cold War era, which was marked by the transition from a bipolar to the 'unipolar moment' (Krauthammer)[591] shaped by the U.S.' supremacy in the international system of the late 20th century.

The second row of documents arrived around the millennium, when NATO was undertaking its first Eastern enlargement by including former Warsaw Pact members Poland, Czech Republic and Hungary, while Russia was undergoing a leadership change from Yeltsin to Putin, and the U.S. adapted, *inter alia*, its nuclear deterrence posture after the 9/11 terrorist attacks.

The third and final range of documents coincidentally came in the same year (2010), which represented the eventual end of a certain part of the post-Cold War era, because the next 'time stop' would be 2014, when Russia conducted its illegal annexation of Crimea and supported a proxy conflict in the Ukrainian Donbas region.

In view of the distribution of these documents across the three players and times, the empirical analysis throughout the empirical analysis was structured according to following period of examination: (1) The initial post-Cold War era starting point (year: ~1992), (2) the 1st decade (year: ~2001) and (3) the post-Cold War era after 2nd decade (year: ~2010).

For completeness, it should be noted that the core documents were further validated by other high-level politico-military strategic documents that were published at or near the temporal juncture points.

At each one of these three juncture points, the military posture of each player was determined. For Russia as the challenger, the posture has been defined as the threat posture. For the NATO collective and the U.S. as protégé and defender, the posture was NATO's deterrence and defence posture, of course, and the U.S. extended nuclear deterrence.

[591] Krauthammer, C. (1991): The Unipolar Moment, pp. 23-29.

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The posture for each player is separated in the result 'hard', 'soft' and 'inconclusive':
If a player has a majority of indicators that promote a hard position, the posture is determined as 'hard' and signals the intention of the player that he prefers a conflict over his own concession.
If a player has a majority of indicators that suggest a soft position, the posture is identified as 'soft' which reveals the willingness to avoid a conflict by giving in to the other player's demands.
If a player as no majority in its criteria for 'hard' or 'soft', because he provides ambiguous signals, the posture is set as 'inconclusive'. For the eventual equilibria analysis in subchapter 4.6, it is assumed that the inconclusive player can either be 'hard' or 'soft' leading to different game outcomes. From a theoretical and practical perspective, such indecisiveness does not constitute a problem *per se*, because states often emit contradictory signals and any other player has to cope with the same problem under incomplete information, namely understanding the position of the other(s).
For the empirical analysis, the determination of a player's posture in terms of hard, soft or inconclusive is derived from the examination of the high-level strategic documents as identified above.
For the challenger, the following criteria[592] for the postures apply:

No.	*Indicators for a hard posture*	*Indicators for a soft posture*
1	Define the defender/protégé as a military threat to the challenger	Definition the defender/protégé as a military danger at most to the challenger
2	Retain/increase the warfighting posture against a defender/protégé	Decrease the warfighting posture against a defender/protégé
3	Retain/increase the role of nuclear weapons in the military doctrine	Decrease the role of nuclear weapons in the military doctrine
4	Strengthen military capability development in order to close the capability gap with the defender/protégé	No mention of military capability development for closing the capability gap with the defender/protégé

Table 20: Challenger's criteria for each posture in an integrated conventional/nuclear deterrence game

In contrast to the regular game-theoretic approaches of PDT and beyond, the protégé's role was attributed to a military alliance that consists of at least two states that coordinate their joint alliance policy through unanimous decision-making. The expressions of the military alliance's postures are defined below:

[592] The difference between military threat and military danger is an empirical question that is determined by the definitions, on which Russia's military doctrines are based. Subchapter 4.3.2 addresses these definitions ahead of the credibility analysis.

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No.	*Indicators for a hard posture*	*Indicators for a soft posture*
1	Increase/retain a forward presence in allied member states' territory with exposed borders	Limit/remove a forward presence in allied member states' territory with exposed borders
2	Definition of clear military capability requirements pertaining to the core task of deterrence and defence	No or limited definition of generalised military capability requirements pertaining to the tasks of the military alliance
3	Establish a balance between national commitments and multinational formations in the military alliance's deterrence and defence posture	Establish multinational formations as favoured part of the military alliance's deterrence and defence posture
4	Increase/retain the nuclear dimension of the military alliance's deterrence and defence posture (incl. BMD)	Decrease/limit the nuclear dimension of the military alliance's deterrence and defence posture

Table 21: Military alliance 'collective' criteria for each posture in an integrated conventional/nuclear deterrence game

Lastly, the particular role of the defender for the military alliance that consists of the provision of the (strategic) nuclear deterrent is presented in the attached table:

No.	*Indicators for a hard posture*	*Indicators for a soft posture*
1	Strengthen the military warfare role of nuclear weapons in the defender's nuclear defence policy	Retain/weaken the military warfare role of nuclear weapons in the defender's nuclear defence policy
2	Developing a post-*status quo* role for the defender's (extended) nuclear deterrent within the remit of its nuclear defence policy	Retaining the *status quo* of the defender's (extended) nuclear deterrent within the remit of the of its nuclear defence policy
3	Enhancing the defender's commitments to the military alliance through extended nuclear deterrence	Retaining/limiting the defender's commitments military alliance through extended nuclear deterrence
4	Developing a full-scale capability in the field of ballistic missile defence; with a focus on strategic ballistic missile defence	Developing a limited capability in the field of ballistic missile defence; with a focus on theatre-ballistic missile defence

Table 22: Defender's criteria for each posture in an integrated conventional/nuclear deterrence game

Each of the pairs of criteria is mutually exclusive, while a mixture of elements of both hard and soft posture remains possible. In such cases, the outcome is marked as inconclusive but a tendency is provided based on the empirical observations of the respective player's actions and behaviour.

The question about the 'why' might now arise, given that each of these decisions that constitute a hard or soft posture have considerable politico-military implications for the countries that announced them as well as the other states in this three-player game. This issue is revisited in more detail in subchapter 4.1.2, because politico-military decisions in the field of general deterrence are not taken in isolation but rather in connection with the expected pay-offs.

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4.1.2.2 The analysis of capability with quantitative methods

In order to analyse the players' military capabilities in their relation of being either 'capable' 'partial capable' or 'incapable', this dissertation pursues a quantitative analytical approach in accordance with Walt, who suggested to use hard data in order to determine the state of affairs for each state.[593]

Considering that general economic variables, such as labour, capital, and technology are often drawn upon for measuring outputs of a national economy, a similar approach can be used for military-related outputs as well. In the scope of this research on deterrence, defence expenditures and military personnel are considered as a representative baseline for the assessment of national and alliance-wide deterrence and defence efforts[594], while military capabilities are interpreted in a stricter sense as the total numbers of specific military equipment, such as tanks, fighter aircraft, artillery and other 'weapons of war'.

While defence expenditures and military personnel numbers are available in different statistical publications, a collection of data on military equipment requires considerable effort with a thorough understanding of the practical side of military affairs. The 'landmark' publication on questions pertaining to military equipment is the 'The Military Balance' (MB) publication.[595] The data from MB is very complex due to the high granularity of the data collection and presentation[596] and not easy to integrate in an analysis. In order to tackle this methodological problem, a group of researchers led by Gannon and supported by the Center for Peace and Security Studies at the University of California, San Diego, made a comprehensive effort to categorise all MB military equipment records for the time period 1970-2014. The intentions of the researchers had been to generate a 'Distribution of Military Capabilities (rDMC) Dataset' for enabling further military capability-focussed analyses. [597] The dataset has been published in

[593] Walt, S. (1985): Alliance Formation and the Balance of World Power, pp. 34 f.

[594] Since 2006, the transatlantic alliance employed the 2% per GDP defence investment guideline, see: NATO (2022): Funding NATO, Hyperlink: https://www.nato.int/cps/en/natohq/topics_67655.htm (Last visit: 01.01.2023).

[595] 'The Military Balance' is a renown annual publication that provides the most comprehensive collection of data on national military capabilities worldwide. This multiannual flagship research project is produced and published by the British defence think tank *International Institute for Security Studies* (IISS) since its founding in 1958. See: IISS (n.a.): About us, Hyperlink: https://www.iiss.org/about-us/ (Last visit: 18.10.2022).

[596] Taking the U.S. 'entry' most extreme example, MB lists military equipment separated for each branch of the military, military force structure down to battalion-level, troop deployments, and more. For reference, see: IISS (2017): The Military Balance 2017, pp. 45-60.

[597] Gannon, J. A. (2021): rDMC Codebook, pp. 4 f. Hyperlink: https://www.militarycapabilities.com/codebook (Last visit: 19.11.2022).

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September 2021 and is therefore quite novel at the time of this dissertation and is also publicly available.[598]

The research group published three different versions of the dataset: (1) rDMC_Raw, wherein the pure data down to singular equipment designations (such as Leopard 2A6 or Eurofighter Typhoon from the German armed forces), (2) rDMC_Long, and (3) rDMC_Wide, which provide the same information in two different table formats, namely either country-year-technology or country-year per row.

In this dissertation, the rDMC_Wide has been selected as the variant most suitable for the further analysis due to its country-year structure. Subsequently, the base population has been defined as all member states of NATO for the timeframe 1992-2014 (i.e., the final year of the dataset). Because of the assumptions in relation to pure public goods, which were introduced in subchapter 2.4.1, neither distinctions were made between military capabilities across the member states nor a discount factor introduced for extent of the national commitment in terms of capabilities contributed to NATO. The sum of the respective national military capabilities per year were attributed to NATO in that year, thus leading to the collection of all military capabilities across 66 technology categories in service of the transatlantic alliance. As an important restriction for further analysis, the military equipment was only taken into account, when a positive number > 0 was registered for a state's capability in a given year. Considering that not every single one of those 66 technology categories be relevant for measuring deterrence by capability quantities, there must be additional guidance for making the case of a reduced selection.

This was done through approximation of the dataset in conjunction with the Treaty-Limited Equipment (TLE) categories from the Treaty on Conventional Forces in Europe (CFE Treaty). The basic idea behind the TLE was that the CFE Treaty's signature states from the Euro-Atlantic region intended to prevent any surprise attack or large-scale military operation in Europe, hence they agreed on particularly relevant military equipment that is used for that objective.[599] The TLE of the CFE are listed on the left below and the rDMC categories were approximatively matched accordingly:

[598] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

[599] OSCE (1990): Treaty on Conventional Armed Forces in Europe, Preamble, p. 1, Hyperlink: https://www.osce.org/files/f/documents/4/9/14087.pdf (Last visit: 24.11.2022).

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TLE categories of the CFE Treaty	*rDMC categories*
Battle Tanks	armoured fighting vehicles_attack[600]
Armoured Combat Vehicles (ACV)	armoured fighting vehicles_transport
Artillery	anti-tank/anti-infrastructure_artillery; land/sea defence_surface to surface artillery; land/sea defence_surface to surface missiles
Combat Aircraft	aircraft_attack; aircraft_fighter;
Attack Helicopters	helicopters_attack

Table 23: Transformation matrix TLE categories of CFE Treaty <-> rDMC categories[601]

The table above represents a constructive effort to translate the essential conventional capabilities. Considering the complexity of military equipment, it might be very helpful at this point to provide some basic definition, what exactly each rDMC categories factually entail. Before providing the tables below, it should be noted that the CFE Treaty's list of TLE equipment should not be considered the 'alpha and omega' of military capabilities, especially in light of the rDMC total of 66 separate capability categories.

At this point, it should be stressed that the transformation of the CFE Treaty categories into rDMC equipment categories suffers from a varying degree of fuzziness due to the different definitions about the scope of the individual military capabilities. Taking a prominent example, the U.S. Air Force B-52 Bomber represented an important cornerstone of its nuclear triad since the Cold War. However, these types of aircraft were not limited to strategic deterrence, but also used as conventional bombers in different conflicts, such as operation 'Desert Storm' in 1990.[602] So, bomber quantities might have an impact for both the conventional air domain capabilities and the nuclear domain capabilities. Furthermore, it should be noted that maritime and nuclear capabilities were not part of the CFE Treaty at all.

In order to enable a more granular analysis, the eight rDMC military capability categories derived from the five CFE Treaty TLE categories were extended by nine further rDMC categories that were identified by the author based on general military studies-related knowledge and re-arranged in five groupings for the following domains: (1) Air domain, (2) Land domain, (3) Land close air support domain, (4) Maritime domain, and (5) Nuclear domain.

[600] Includes Armoured Infantry-Fighting Vehicles (AIFV).
[601] OSCE (1990): Treaty on Conventional Armed Forces in Europe, Preamble, p. 7, Hyperlink: https://www.osce.org/files/f/documents/4/9/14087.pdf (Last visit: 24.11.2022); and: Gannon, J. A. (2021): rDMC Codebook, pp. 17-20, Hyperlink: https://www.militarycapabilities.com/codebook (Last visit: 19.11.2022).
[602] US Air Force (n.a.): B-52H Stratofortress, Hyperlink: https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104465/b-52h-stratofortress/ (Last visit: 08.12.2022).

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While the CFE Treaty was mainly used as a first rough starting point for determining the most relevant air and land capabilities, for the remainder of this subchapter and the empirical analysis, 17 selected rDMC categories become the dataset for the determination of a player's capability as 'capable' or 'partially capable' or 'incapable'.

The definitions of each of the 17 rDMC categories can be found in the tables per domain below. The Air domain consists of four categories, whereof three employ offensive capabilities and one is a supporting role:

Variant	*Definition*
aircraft_attack	Fixed-wing aircraft with the primary function of carrying out airstrikes, which are equipped to respond to air defences and are distinguished from bombers through their greater capacity for precision. They also provide close air support for friendly ground troops
aircraft_fighter	Fixed-wing aircraft designed primarily for air-to-air combat, which may also have a limited air-to-surface capability
aircraft_bomber	Comparatively large fixed-wing aircraft intended for the delivery of air-to-surface ordnance
aircraft_transport	Fixed-wing aircraft intended for military airlift. In some years (2011-2019), these aircraft are further categorized according to the following payload ranges: - Light transport aircraft have a maximum payload of up to 11.340kg - Medium transport aircraft have a maximum payload of up to 27.215kg - Heavy transport aircraft have a maximum payload of above 27.215kg

Table 24: Types of air military capabilities for conventional deterrence, identified from the rDMC codebook[603]

The five categories from the land domain offer offensive military capabilities in general and key mobile military capabilities in particular (armoured fighting vehicles_attack contain Battle Tanks and Armoured Infantry-Fighting Vehicles, while Armoured Personnel Carriers are included in armoured fighting vehicles_transport). The other categories contain different forms of tube and missile artillery. It should be noted that the respective rDMC categories on surface-to-surface weaponry do not separate between land and sea-based platforms. This marks already a 'break' from the CFE Treaty that does not cover maritime and nuclear assets).[604]

[603] Gannon, J. A. (2021): rDMC Codebook, pp. 17 f., Hyperlink: https://www.militarycapabilities.com/codebook (Last visit: 19.11.2022).

[604] For reference, see the last paragraph of the Treaty Analysis in: McCausland, J. (1995): The Conventional Armed Forces in Europe (CFE) Treaty: Threats from the Flank, Hyperlink: https://nuke.fas.org/control/cfe/news/apj-95-mccaus.htm (Last visit: 01.01.2023).

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Variant	*Definition*
anti-tank/anti-infrastructure_artillery	Unguided "fire and forget" launchers. Long-range, high-power weapons with a calibre greater than 100mm capable of engaging hardened ground targets with indirect fire
armoured fighting vehicles_attack	Armoured, tracked fighting vehicles with a turret-mounted gun of at least 75mm calibre, designed to carry out offensive attacks on enemy defences. In some years, vehicles in this category are categorized further by weight: - Vehicles are considered main battle tanks if they weigh 25 metric tonnes unladen or more, while vehicles weighing less than this are considered light tanks (2014-2019) - Vehicles are considered main battle tanks if they weigh 16.5 metric tonnes unladen or more (1990-2013)
armoured fighting vehicles_transport	Armoured fighting vehicles designed and equipped to transport infantry or carry out reconnaissance
land/sea defence_surface to surface artillery	Artillery mounted on ground or naval forces designed to launch munitions at ground or surface targets
land/sea defence_surface to surface missiles	Missiles launched from ground or naval forces designed to destroy ground or surface targets

Table 25: Types of land military capabilities for conventional deterrence, identified from the rDMC codebook[605]

The land close air support category contains different types of rotary-wing craft that serve various support roles for the ground forces in offensive and defensive operations:

Variant	*Definition*
helicopters_attack	Helicopters designed for delivery of air-to-surface weapons, and fitted with an integrated fire control system
helicopters_transport	Helicopters intended for military airlift. In some years, these helicopters are further categorized according to the following internal payloads: […] - Medium transport helicopters have an internal payload of up to 4.535kg (2011-2019) - Heavy transport helicopters have an internal payload of 4.535kg or more (2011-2019)
helicopters_utility	General-purpose helicopters which are usually used for transport, but also serve as sufficient substitutes for specialized platforms in the performance of other duties. They typically perform non-combat functions, including command and control, special operations, etc.

[605] Gannon, J. A. (2021): rDMC Codebook, pp. 19-22, Hyperlink: https://www.militarycapabilities.com/codebook (Last visit: 19.11.2022).

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Table 26: Types of land close air support military capabilities for conventional deterrence, identified from the rDMC codebook[606]

The rDMC provides a selection of different categories from the maritime domain, which simplify the selection of without any further guidance from the CFE Treaty. Those vessels that are designated as principal surface combatants play the crucial role in maritime combat operations and are hereby listed as the relevant military capabilities. In addition, attack submarines (regardless if they are conventional- or nuclear-powered) further add critical offensive capabilities in addition to their stealth ability, when submerged:

Variant	*Definition*
principal surface combatants_aircraft carrier	Principal surface combatants, powered by nuclear or non-nuclear means, with a flat deck primarily designed to carry fixed- and/or rotary-wing aircraft
principal surface combatants_cruisers	Principal surface combatants with an FLD (fluid displacement) satisfying: - Above 9.750 tonnes (2011-2019) - Above 8.000 tonnes (1988-2010) […]
principal surface combatants_destroyers	Principal surface combatants with an FLD satisfying: - Above 4.500 tonnes (2011-2019) - Less than 8.000 tonnes and generally having an anti-air role but also potentially having an anti-submarine capability (1988-2010) […]
principal surface combatants_frigates	Principal surface combatants with an FLD satisfying: - Above 1.500 tonnes (2011-2019) - Less than 8.000 tonnes, and generally having an anti-submarine role (1988-2010) […]
submarines_attack	Submarines, which are designed to attack other submarines, ships, or land forces

Table 27: Types of maritime military capabilities for conventional deterrence, identified from the rDMC codebook[607]

Given the timeframe of 1992-2014 that could be extracted from the rDMC categories is (1) difficult to reasonably display in figures and tables without being drowned in the granularity of numbers, the count was conducted in triennial steps beginning in 1992 and ending in 2013. Furthermore, the final year of the dataset, 2014, was added to have an awareness of the

[606] Gannon, J. A. (2021): rDMC Codebook, pp. 20 f., Hyperlink: https://www.militarycapabilities.com/codebook (Last visit: 19.11.2022).
[607] Gannon, J. A. (2021): rDMC Codebook, pp. 24-26, Hyperlink: https://www.militarycapabilities.com/codebook (Last visit: 19.11.2022).

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quantities in the selected military capabilities that existed at the time of the 2014 Russian annexation of Crimea.

In order to ensure a comparison between the quantities of the military forces of the challenger, protégé and defender, ratios were calculated in a x.xx-to-1 relation. In order to highlight the variance between the total NATO members and the European NATO member states (all members minus the U.S. and Canada), the ratios were provided in the following constellations: (1) Russia:NATO, (2) Russia:NATO-Europe, (3) NATO:Russia, and (4) NATO-Europe:Russia. Since the benchmark for a 'credible' capability has been set at $1 - 1.5 : 1$ between the different player sets.[608] In the scope of this dissertation's quantitative assessment of the different capabilities, the following points of reference applies:

- When the first number is at or above ≥ 1 to 1 the capability was 'credible',
- When the first number was is between 0.9 and 1 to 1, the capability is 'partial credible' because of the narrow margin between the capability's quantity of the players, and
- When the first number is ≤ 0.89 to 1 the capability is 'not credible',

Following the selection of the different types of rDMC categories per domain as defined above, the key analytical element is to be applied:

1	*Russia-NATO MilCap Ratio*	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
		x.xx:1	…	…	…	…	…	…	…	…
2	*Russia-NATO-Europe MilCap Ratio*	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
		x.xx:1	…	…	…	…	…	…	…	…
3	*NATO:Russia MilCap Ratio*	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
		x.xx:1	…	…	…	…	…	…	…	…
4	*NATO-Europe:Russia MilCap Ratio*	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
		x.xx:1	…	…	…	…	…	…	…	…

Table 28: Sample overview of the force ratios per military capability (MilCap) between a pair of players throughout 1992-2014, separated in triennial time units

Through the practical conduct of these ratio calculations, it was discovered by the author that considerable parts of the rDMC dataset were either incorrect or contained only incomplete information (either due to the IISS MB edition errors or because the rDMC capabilities were not completely coded). For example, practically all of Russia's various main battle tanks (T-90; T-72/L/T-72M; T-64A/T-64B; T-62; T-54/-55; T-80/-M9) were not tracked through the

[608] Karber, P./Combs, J. (1998): The United States, NATO, and the Soviet Threat to Western Europe: Military Estimates and Policy Options, 1945-1963, pp. 421 f.

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years 1993-1999. Another example are the missing large numbers of fighter-ground attack aircraft (F/A-18 Hornet/Super Hornet) from U.S. (naval aviation) arsenals in 1991-1998.

As a consequence of this issue, the quantities displayed through the rDMC must be looked upon with a critical view, as some parts of the data appears more adequately providing a logical evolution curve than others. So, the rDMC can provide a tendency, which is sufficient for a descriptive-statistical rough analysis and if performed across different categories and time, it provides a sufficient situational picture on the capability potential of states or groups of state. For any more advanced data analysis, the data set requires more detailed review and eventually data correction, where necessary.

In order to mitigate this issue at the one hand and to still prove the validity of force ratios for determining the status of capabilities of each player, two more recent data lists from 2022 were included in the domain-specific analyses.

One such validation source was published by Statista that compiled data from the Global Firepower Index and SIPRI that provides a summary collection of quantities per specific military equipment type.[609]

Another validation source was provided by the Global Firepower Index, who applied a set of assumptions in regard to NATO's commitment level per individual member states would be at least ten percent of their national equipment as well as availability levels of equipment in Russia, which was set at 75 percent.[610]

In regard to these two alternative datasets, two specific points need to be highlighted.

The methodology used by both alternative datasets diverge from the definitions of the rDMC categories dataset. Therefore, a brief matching is conducted for each domain for Russia in subchapters 4.3.2.2 to 4.3.2.5 and for NATO in subchapters 4.4.2.2 to 4.4.2.5.

Furthermore, the 2022 NATO Projected Global Firepower Index applied a methodology based on two assumptions:

(1) For Russia the Global Firepower assumes a 75 percent availability rate instead (i.e., discount because of inoperable equipment), which is a reasonable consideration, and

(2) A commitment assumption for each NATO member state contributing to the transatlantic alliance. The Global Firepower has set this commitment to ten percent of the individual member state's military inventories in order to "true fighting capabilities'

[609] Statista (2022): Comparison of the military capabilities of NATO and Russia as of 2022, Hyperlink: https://www.statista.com/statistics/1293174/nato-russia-military-comparison/ (Last visit: 25.01.2023).

[610] GFP (2022): 2022 NATO Projected Global Firepower, Hyperlink: https://www.globalfirepower.com/nato-projected-firepower.php (Last visit: 25.01.2023).

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of the collective (the assumption being that no one power would commit all of its actual, available fighting forces to the fray)." (GFP)[611]

Altering number counts for physically existent military capabilities make sense and can be more adequate, when factors such as damaged or inoperable equipment are included. The approach of the Global Firepower Index' approach, however, is more revolutionary than that: Regardless of the availability of equipment in NATO's member states, it is assumed that only a certain fraction of any state's military capabilities might come into play in a conflict between NATO and Russia.

However, the GFP assumption needs to be taken with great caution because such a number is rather political than military-related. From an empirical perspective and since there has not been a geopolitical crisis in the Euro-Atlantic region (yet) that asked NATO's member states full commitment of their available military capabilities[612] to engage another state or coalition of states with peer- or near-peer capabilities[613], any percentage between 0 and 100 percent would theoretically be possible as a baseline for ratio calculations. In essence, it is the decision of a NATO member state, how much it wants to contribute to the alliance's operations. For a general deterrence setting, such estimations *a priori* are extremely hypothetical because this type of deterrence does not cover specific crisis situations wherein NATO members would assess their contribution levels. And while the ten percent assumption cannot be validated without a member state's feedback (which one should not expect in view of the sensitivity of that question for the military security of NATO and the reputation of the member state in terms of his reliability towards its allies), it is still a helpful benchmark when reviewed in conjunction with the Statista dataset that uses the same nomenclature of military capabilities. In addition, the GFP represents important alternative indicator that corrects the simple alliance aggregate provided 2022 Statista, that just adds up quantities of military capabilities without regard to the political context.

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[611] GFP (2022): 2022 NATO Projected Global Firepower, Hyperlink: https://www.globalfirepower.com/nato-projected-firepower.php (Last visit: 25.01.2023).

[612] The invocation of Article 5 – for the first time in NATO's history – in response to the 9/11 terrorist attacks on the U.S. occurred as an act of solidarity, but did not entail full mobilisation of the allied member state's military forces. See: NATO (2022): Collective defence and Article 5, Hyperlink: https://www.nato.int/cps/en/natohq/topics_110496.htm (Last visit: 18.10.2022).

[613] The attributes 'peer' and 'near-peer' in relation to capabilities as well as adversaries or competitors mark states that rival the U.S. dominance in technology and potentially its regional or global standing, as well. See: US Department of Defense (2020): Near-Peer Threats at Highest Point Since Cold War, DOD Official Says, Hyperlink: https://www.defense.gov/News/News-Stories/Article/Article/2107397/near-peer-threats-at-highest-point-since-cold-war-dod-official-says/ (Last visit: 01.10.2022); and BAE Systems (n.a.): What are Near Peer Weapons?, Hyperlink: https://www.baesystems.com/en-us/definition/what-are-near-peer-weapons (Last visit: 01.10.2022).

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The following Global Firepower Index categories for both validation datasets were included in the analysis and attributed to individual conventional capabilities:

(1) Total aircraft, Fighters/Interceptors, Ground Attack aircraft, and Transport aircraft were attributed to Air domain capabilities
(2) Main battle tanks, Armoured vehicles, Self-propelled artillery. Towed artillery, and Self-propelled rocket launchers were attributed to Land domain/effects capabilities:
(3) Total helicopters and Attack Helicopters were attributed to Land close air support capabilities; and
(4) Total naval assets, Aircraft carriers, Helicopter carriers, Destroyers, Frigates, Corvettes, and Submarines were attributed to Maritime domain capabilities:

Following the overview on the methods used for examining the conventional capabilities per player, the final grouping not yet covered has been the nuclear domain. While the other capabilities focussed on conventional equipment used in traditional warfare, nuclear capabilities from both Russia and the U.S. are structured in accordance with the concept the nuclear triad[614], which consists of land-based nuclear missiles or Intercontinental Ballistic Missiles (ICBM, submarine-launched ballistic missiles (SLBM), and heavy bombers that can principally fulfil both conventional and nuclear roles, as the example of the U.S. B-2 Stealth Bomber has already proven through its use in various conventionally fought conflicts.[615]

As a consequence of the destructive nature of nuclear weapons in warfare and their political role in international affairs (for example by threatening other states through 'nuclear blackmailing'), this category requires a different analytical approach. Thus, it was examined not through a ratio comparison between Russia and the U.S. as nuclear-armed challenger and defender, but by a more explorative survey of the individual parts of the nuclear triad in terms of delivery method, range, and yield in TNT equivalent. Given that both the Russian and U.S. arsenals physically exist and remain in active operation, it is assumed that both players are in principle 'capable' in the nuclear domain. Hence, for quantitative purposes, the nuclear domain counts as one capability and the 'capable' status are added to the list of the defender and challenger. For practical reasons, the protégé in the specific case study does also receive the notion 'capable', even though theoretically he is a non-nuclear armed player. The justification

[614] For a short definition of 'nuclear triad', see: Encyclopedia Britannica (n.a.): Definition of 'Nuclear Triad', Hyperlink: https://www.britannica.com/topic/nuclear-triad (Last visit: 01.01.2023).
[615] The National Interest (2021): "Bombs Away: Why The B-2 Stealth Bomber Wins Wars", Hyperlink: https://nationalinterest.org/blog/reboot/bombs-away-why-b-2-stealth-bomber-wins-wars-198254 (Last visit: 01.1.2023).

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for this deviation rests in the independent nuclear arsenals of France and the UK that are thereby empirically taken into account.

4.2 Cooperative security arrangements in the post-Cold War era

Chapter 4.2 is separated in six further subchapters. Subchapter 4.2.1 provides a brief introduction to the topic of cooperative security arrangements in terms of what it is and why it is relevant in the empirical analysis of this dissertation. Subchapter 4.2.2 introduces the multilateral1990 Conventional Forces in Europe (CFE) Treaty that led to massive reductions in overall conventional armaments levels in the Euro-Atlantic region. Subchapter 4.2.3 provides an overview on four post-Cold War era U.S.-Russian nuclear disarmament treaties (1991 START I, 1993 START II, 2002 SORT, 2010 New START) that brought an immense nuclear disarmament in the two powers with the largest nuclear arsenals worldwide. Subchapter 4.2.4 gives insight into two U.S.-Soviet legacy treaties of the Cold War, namely the 1972 ABM Treaty and the 1987 INF Treaty. The restrictions in each of the treaties impacted military capability development in two decisive capability-related aspects: (1) Restricting the development of ballistic missile defence systems tasked with intercepting intercontinental nuclear and conventional ballistic missiles, and (2) forbidding the development and deployment of medium-range and intermediate-range ballistic missiles (MRBMs/IRBMs). Subchapter 4.2.5 provides the politico-military context through the 1997 NATO-Russia Founding Act. This document was established as the baseline agreement between the alliance and Russia in preparation of the first NATO Eastern enlargement of 1999. Lastly, subchapter 4.2.6 gives a short wrap-up of the previous subchapters, including a summary conclusion on the impact of these cooperative security arrangements on the behaviour of the states within the remit of the integrated conventional/nuclear deterrence game analysed throughout Chapter 4.

4.2.1 Introduction

Bi- and multilateral cooperative security arrangements provide the politico-military context in which Russia, NATO, and the U.S. have formulated their foreign, security, and defence policies after the end of the Cold War. The treaties that are displayed in subchapters 4.2.2 to 4.2.5 were selected after careful consideration regarding quantitative impact on military capabilities in terms of the stockpiles of conventional and nuclear weapons as well as offensive (MRBMs and IRBMs) and defensive weapons development (BMD). In addition, one treaty – the 1997 NATO-Russia Founding Act – has been selected because it represents the central cornerstone of the

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cooperative security framework, thereby connecting NATO with Russia in the post-Cold War era.

While these are formally not a part in the integrated conventional/nuclear deterrence game, the documents that two and more countries have agreed upon represent a milestone in international affairs. From the conceptual point of view, the purpose and value of arms control is unquestionable. Arms controls intends to

> "[…] limit the numbers, types, or disposition of weapons. [The reason for arms control is that, BL.] Sovereign states face a security dilemma when their efforts to make themselves feel more secure by building weaponry make their opponents feel more insecure. Through reassurance of the adversary a state can help to alleviate the security dilemma – in other words, to create common security." (Nye)[616]

In regard to the difference amongst arms control and disarmament treaties and agreements, one could take e.g., the 1968 Nuclear Non-Proliferation Treaty (NPT) and the U.S.-Soviet bilateral nuclear arms control and reduction treaties as two particular examples. The main intention of the NPT had been to restrict the spread of nuclear weapons to those states that did not have any prior to the 1968 NPT. Thus, the treaty 'lives' with the number of states in the international system that abide to it.[617] In comparison, the U.S.-Soviet strategic nuclear arms control treaties refer to two distinct states and the intended 'taming' of the risk of nuclear war resulting from the existence of large nuclear arsenals owned by those two states.[618] The measurement of arms control and disarmament treaties in regard to their successfulness can be conducted by a logical cross-check between the agreed quantities of weapons with the empirical reality, which is obviously flawed since the impression is just a static situational picture taken at the time of the check. There is, however, a further and more intriguing possibility of a qualitative theoretic examination which is informed by quantitative information by which the bargaining subject (such as limitation of a specific type of weapon) are put into broader context.[619] This approach might be more helpful when explaining the interrelationship between the exit of the U.S. from the ABM Treaty and the abandonment of the CFE treaty by Russia.

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[616] Comment in brackets by the author, otherwise for reference, see: Nye, J. (1991): Arms Control and International Politics, p. 145.

[617] For more details, see: UN (n.a.): Treaty on the Non-Proliferation of Nuclear Weapons (NPT), Hyperlink: https://www.un.org/disarmament/wmd/nuclear/npt/ (Last visit: 31.10.2022).

[618] For reference see: Center for Arms Control and Non-Proliferation (2022): U.S.-Russian Nuclear Arms Control Agreements at a Glance, Hyperlink: https://www.armscontrol.org/factsheets/USRussiaNuclearAgreements (Last visit: 31.10.2022).

[619] See the arguments for and against the effectiveness of NPT between optimists and pessimists in: Fuhrmann, M./Lupu, Y. (2016): Do Arms Control Treaties Work? Assessing the Effectiveness of the Nuclear Nonproliferation Treaty, pp 530-533; for a more axiomatic approach, namely a quid-pro-quo, between a state and another state in terms of exchanging freedom of policy for security, see: Wolfsthal, J. B. (2020): Why Arms Control?, pp. 101-105.

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In a nutshell, agreements and treaties pertaining to arms control, disarmament and non-proliferation for the international system have been an important cornerstone of the international system for long-time. In view of the three post-Cold War NATO strategic concepts examined in this dissertation, the subsequent attribution of some space in this doctoral thesis on this topic is considered relevant from a deterrence perspective.[620]

However, due to the horrific experiences from two world wars as well as the first use of nuclear weapons on Hiroshima and Nagasaki in August 1945, the efforts done by the community of states in the international system in order to contain the worst effects from the use of the destructive modern-day weaponry reached an unprecedented level in the second half of the 20th century. Since the early to mid-1990s, disarmament processes in both the conventional[621] and nuclear domain haven taken place[622].

In that sense, numerous agreements have led to the regulation (e.g. missile technology control) or outright ban (e.g. biological or chemical weapons) of military capabilities; agreements, which were often signed by nuclear- and non-nuclear states alike.[623] Considering that the full scope of arms control and disarmament cannot be displayed here, the aim is be to identify the essential non-NATO cooperative security treaties – in the format of arms control and disarmament – that have an essential impact on the conventional and nuclear military capabilities' 'landscape' of NATO/U.S. and Russia in the post-Cold War era.

Qualitative source	*Type*	*Involved actors*
1990 CFE Treaty	Arms control agreement/treaty	Multilateral (OSCE members)
1991 START I Treaty 1993 START II Treaty 2002 SORT Treaty 2010 New START Treaty	Arms control agreement/treaty	Bilateral (U.S.-Russia)
1972 ABM Treaty	Arms control agreement/treaty	Bilateral (U.S.-Russia)
1987 INF Treaty	Arms control agreement/treaty	Bilateral (U.S.-Russia)

[620] For example, see paragraphs 3-4, 6, 21, 25-29, 33 in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022); paragraphs 14-16, 19, 31, 49 in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022), and paragraph 26 in: NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', pp. 23-25, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 03.12.2022).

[621] SIPRI noted that the 1990 CFE Treaty has led to the destruction or conversion of around 51.550 so-called treaty-limited equipment (TLE) by 1. January 2000. The main advances in this reduction occurred in the early years of 1992-1995. See: SIPRI (2001): SIPRI Yearbook 2001, Chapter 8. Conventional arms control, p. 551, Hyperlink: https://www.sipri.org/sites/default/files/SIPRIYB0108.pdf (Last visit: 22.10.2022).

[622] In 1986, the total global nuclear weapon stockpiles had peaked at more than 64.000 warheads and fell continuously to around 10.215 in the year 2013. See: Kristensen, H./Norris, R. (2013): Global nuclear weapons inventories, 1945-2013, p. 78.

[623] For a short introduction to arms control, disarmament, and non-proliferation, see: BICC/BPB (2013): A short history of disarmament and arms control, Hyperlink https://warpp.info/en/m7/articles/m7-01 (Last visit: 10.12.2022).

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1997 NATO-Russia Founding Act	Cooperative security framework agreement	Multilateral (NATO members + Russia)

Table 29: Selected treaties with quantified conventional and nuclear force limitations for the Euro-Atlantic region

The above treaties in Table 29 were selected due to their restriction of military technology in combination with actual quantitative numbers for military equipment in terms of weapon systems, nuclear warheads, defensive systems, etc. They will subsequently be reviewed in the next subchapters on non-NATO cooperative security that shape the context of NATO's deterrence and defence posture as well as Russia's potential challenge posture. Lastly, as an additional cornerstone of the cooperative security framework architecture in the Euro-Atlantic region, the NATO-Russia relations in view of its bilateral formalisation since 1994[624] is also highlighted as the contextual backdrop of the three players of the integrated convention/nuclear deterrence game of this dissertation.

4.2.2 The 1990 Conventional Forces in Europe Treaty (CFE)

From the seven treaties just shown, the Conventional Forces in Europe (CFE) Treaty stood out in particular. First of all, it was the only treaty with a focus on mutual quantitative conventional force reductions in a time of transition in the early 1990s. Second, the negotiating states were not limited to the two superpowers in the Cold War, but included the other Eastern European satellite nations in their role as Warsaw Pact members and Western European allies through NATO as well. However, while the individual member states were in the driving seat at the negotiation table, the actual treaty text was inherently linked to the NATO-Warsaw Pact conventional military balance, thus making the CFE Treaty a first expression of the emerging instrument of cooperative security for the benefit of NATO (even though the organisation itself was not a negotiating player).[625] In accordance with the preamble of the CFE Treaty, the basic intentions of the signature states from both military power blocs were expressed via three politico-military objectives:

> "Committed to the objectives of establishing a secure and stable **balance of conventional armed forces in Europe at lower levels** than heretofore, of **eliminating disparities** prejudicial to stability and security and of **eliminating**, as a matter of high

[624] For reference, see: NATO (1994): Partnership for Peace: Invitation, Hyperlink: https://www.nato.int/docu/comm/49-95/c940110a.htm (Last visit: 22.10.2022).
[625] McCausland, J. (1995): The CFE Treaty: A Cold War Anachronism?, p. 3, Hyperlink: https://www.jstor.org/stable/pdf/resrep11754.pdf?refreqid=excelsior%3Ab00d68020648f9105b0e9b524a90e784&ab_segments=&origin=&acceptTC=1 (Last visit: 17.12.2022).

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priority, the **capability for launching surprise attack and for initiating large-scale offensive action in Europe**," (CFE Treaty)[626]

Out of these three objectives, the third one had by far the gravest implications from a conventional deterrence-point of view. If two conventional military power blocs mutually agreed on the reduction of their military capabilities to such an extent that neither the 'blitzkrieg' military option nor the extensive and more time-consuming large military offensive option remain for any side, no power bloc would be able to unilaterally challenge the *status quo* through military action.

In this sense, the signing of the CFE Treaty in November 1990 could be considered a major breakthrough success for achieving military security through cooperative security; especially because – as having said before – the negotiations and final signature included the 'protégé' states in NATO and Warsaw Pact in the Euro-Atlantic region, thereby making the CFE Treaty quite inclusive. After the entry-in-force of the CFE Treaty in November 1992 and throughout its implementation by the mid-1990s, the destruction of a total of around 60.000 pieces of military equipment, consisting of battle tanks, artillery and combat aircraft, had been achieved, thus giving physical proof of the CFE Treaty's effectiveness as an instrument for defusing a conventional arms race in the Euro-Atlantic region.[627] For completeness of the situational picture regarding conventional disarmament, it should be mentioned at this point that reductions in equipment were also accompanied by reductions in the majority of national military personnel on the basis of the complementing CFE-A1 Treaty. As an important distinction from the original CFE Treaty, the CFE-A1 attributed 'treaty-limited equipment' (TLE) to fixed state groups, the military personnel limits were set by individual state, which makes treaty compliance easier to track over time.[628]

The interesting aspects of the original CFE Treaty from a theoretic deterrence perspective were (1) the definition of military equipment identified as vital for a surprise attack and large-scale offensive action, (2) the geographical restrictions for weapons 'ownership' per state party that influenced deterrence in regionally confined areas, together with the attempts of adapting the

[626] OSCE (1990): Treaty on Conventional Armed Forces in Europe, Preamble, p. 1, Hyperlink: https://www.osce.org/files/f/documents/4/9/14087.pdf (Last visit: 24.11.2022).
[627] Federal Foreign Office (2021): Treaty on Conventional Armed Forces in Europe (CFE Treaty), Hyperlink: https://www.auswaertiges-amt.de/en/aussenpolitik/themen/-/218430 (Last visit: 17.12.2022).
[628] See section II, p.5., in: OSCE (1992): Concluding Act of the Negotiation on Personnel Strength of Conventional Armed Forces in Europe (CFE-1A Agreement), Hyperlink: https://www.osce.org/files/f/documents/8/b/14093.pdf (Last visit: 18.12.2022).

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text in reaction to demise of the Eastern bloc in the mid- to late-1990s, and (3) Russia's eventual decision to withdraw from the treaty in July 2007 followed by NATO's response.[629]

Within the remit of the CFE Treaty, the decisive military capabilities for offensive use in a large inter-state conventional war have been meticulously defined and military equipment identified in accordance with those definitions.[630] The following Table 30 gives an overview on the main categories as well as the further sub categories for the two main types 'Armoured Combat Vehicles (ACV)' and 'Artillery':

CFE Main Categories	*CFE Sub Categories*
Battle Tanks	-
Armoured Combat Vehicles (ACV)	Armoured Personnel Carriers (APC) Armoured Infantry Fighting Vehicles (AIFV) Heavy Armament Combat Vehicles
Artillery	Guns, Howitzers and Artillery Pieces combining the characteristics of Guns and Howitzers Mortars Multiple Launch Rocket Systems (MLRS)
Combat Aircraft	-
Attack Helicopters	-
APC Look-Alikes	-
AIFV Vehicle Look-Alikes	-
Primary Trainer Aircraft	-
Combat Support Helicopters	-
Unarmed Transport Helicopters	-
Armoured Vehicle Launched Bridges	-

Table 30: Categorisation of conventional forces in accordance with the CFE Treaty[631]

In the scope of the CFE Treaty, five of those main categories were considered as particularly relevant for preventing surprise attacks and offensive military actions, so they were attributed the characteristic of TLE.[632] As a consequence, each of these five categories received a quantitative limit, who was supposed to restrict the 'combined holdings' for each group of states parties (NATO and Warsaw Pact). Equipment in excess of the TLE had to be dismantled from the bloc's combined holdings. Furthermore, the TLE quantities were tied to a geographically defined area, known as 'Atlantic Ocean to the Ural Mountains' (ATTU) region. Therefore,

[629] NTI (2020): Treaty on Conventional Armed Forces in Europe (CFE), Hyperlink: https://www.nti.org/education-center/treaties-and-regimes/treaty-conventional-armed-forces-europe-cfe/ (Last visit: 17.12.2022).

[630] Types of military equipment were identified in the protocols of: OSCE (1990): Treaty on Conventional Armed Forces in Europe, pp. 24-33 and p. 38, Hyperlink: https://www.osce.org/files/f/documents/4/9/14087.pdf (Last visit: 24.11.2022).

[631] OSCE (1990): Treaty on Conventional Armed Forces in Europe, Article II, pp. 2-6, Hyperlink: https://www.osce.org/files/f/documents/4/9/14087.pdf (Last visit: 24.11.2022).

[632] McCausland, J. (1995): The CFE Treaty: A Cold War Anachronism?, p. 3, Hyperlink: https://www.jstor.org/stable/pdf/resrep11754.pdf?refreqid=excelsior%3Ab00d68020648f9105b0e9b524a90e784&ab_segments=&origin=&acceptTC=1 (Last visit: 17.12.2022).

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TLE-relevant equipment, such as U.S. forward deployed material could be removed to the continental U.S. in order to comply with the treaty. The total TLE holdings for the ATTU per group of states were defined in Article IV under paragraph 1 of the CFE Treaty (see Table 31):

CFE Categories	*ATTU[633] ceiling per state group*	*Thereof in active units*
Battle Tanks	20.000	16.500
ACV	30.000*	27.300
Artillery	20.000	17.000
Combat Aircraft	6.800	N/A
Attack Helicopters	2.000	N/A

* Of the ACV ceiling, no more than 18.000 AIFV (and thereof 1.500 heavy armament combat vehicles) are allowed.

Table 31: Ceilings of conventional forces per party (NATO member states <-> former Warsaw Pact members)[634]

While those quantities were defined as mutual limits between NATO and the Warsaw Pact in the 1990 CFE Treaty, there were several political issues with the CFE Treaty, particularly from the Soviet/Russian perspective. When negotiations on the treaty were finalised in November 1990, Soviet President Gorbachev together with Soviet foreign minister Shevardnadze pressed hard for its ratification despite strong opposition by the Soviet military leadership that considered the treaty as extremely detrimental to Soviet politico-military interests in its sphere of influence in Eastern Europe. Resistance by Soviet hardliners against the treaty was obviously severely weakened due to the Soviet Union's collapse till the end of 1991. The 'new' Russian military leadership, however, was looking at the CFE Treaty with no less hostility than the preceding Soviet military out of several reasons pertaining to the cost of disarmament and the constraints for force deployment on its own national territory.[635] In addition, another important drawback of the CFE Treaty from a Russian deterrence-related perspective had been the new military balance with Russia and NATO, because

> "[…] it permits Russia to maintain levels of conventional equipment that are only about a third of those permitted of NATO, and only about twice those permitted of Ukraine." (Falkenrath)[636]

In addition to the total TLE quantities for the ATTU that penalised Russia as primary successor of the fragmentised Soviet Union even further, because (1) the USSR holding limits were divided amongst the succeeding states, and (2) the CFE Treaty furthermore foresaw TLE force

[633] ATTU is the zone of application of the CFE Treaty and geographically defined as 'Atlantic Ocean to the Ural Mountains', see: OSCE (1990): Treaty on Conventional Armed Forces in Europe, Article II paragraph B, p. 3, Hyperlink: https://www.osce.org/files/f/documents/4/9/14087.pdf (Last visit: 24.11.2022).
[634] OSCE (1990): Treaty on Conventional Armed Forces in Europe, Article IV, pp. 7 f., Hyperlink: https://www.osce.org/files/f/documents/4/9/14087.pdf (Last visit: 24.11.2022).
[635] Falkenrath, R. (1995): The CFE Flank Dispute: Waiting in the Wings, p. 119 and pp. 121-124.
[636] Falkenrath, R. (1995): The CFE Flank Dispute: Waiting in the Wings, p. 121.

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deployment restrictions for battle tanks, artillery and ACVs in three overlapping subregional areas in Eastern Europe and in an additional flank zone. The definition of the Eastern flank zone covered Bulgaria, Romania, as well as the Soviet Union's Leningrad, North Caucasus, Odessa, and Transcaucasus military districts (MDs). After the USSR broke up, the four Soviet MDs were transformed into the new entities Azerbaijan, Georgia, Moldova, Ukraine (former Odessa MD), and Russia (with Leningrad and North Caucasus MDs). Thus, TLE limitation entitlements were further split between entities in Eastern Europe, which led Russia to challenge the *status quo* regarding the CFE Treaty's subregional restrictions in the scope of the so-called 'Flank dispute'.[637]

After five years of CFE Treaty implementation, the 1996 treaty review conference concluded that an adaption of the CFE Treaty was required, which, *inter alia*, defined per-country TLE holdings and allowed limited deployments within the remit of military exercises in exceed of territorial limitations.[638] An additional successful outcome of the 1996 review had been the conclusion of a 'Flank Document' that partially accommodated Russian (and Ukrainian) concerns regarding the subregional limitations by readjusting the subregional areas for the TLE limitations and thus providing additional force posturing flexibility for Russia.[639] Furthermore, negotiations of an adapted CFE Treaty began with the eventual signature by the state parties in November 1999. Despite the willingness of Russia (together with the other Eastern non-NATO states Belarus, Ukraine, and Kazakhstan) to move forward on the basis of the 'Adapted CFE Treaty, NATO's member states remained adamant on the 1999 OSCE Istanbul Summit commitment that the withdrawal of Russian military forces from bases in Georgia and Moldova needed to occur as the pre-requisite for further ratification of the adapted treaty.[640] Thus, no progress regarding the implementation of the '1999 Adapted CFE Treaty' has ever been made till today (2022).[641] In December 2007, the Kremlin decided to unilaterally suspend the CFE Treaty in response to various concerns regarding the conditions of the CFE Treaty in face of

[637] For further details on the 'Flank dispute', see: Falkenrath, R. (1995): The CFE Flank Dispute: Waiting in the Wings, pp. 124-133; and: McCausland, J. (1995): The CFE Treaty: A Cold War Anachronism?, p. 3, 5, and pp.13-22, Hyperlink: https://www.jstor.org/stable/pdf/resrep11754.pdf?refreqid=excelsior%3Ab00d68020648f9105b0e9b524a90e784&ab_segments=&origin=&acceptTC=1 (Last visit: 17.12.2022).

[638] NTI (2020): Treaty on Conventional Armed Forces in Europe (CFE), Hyperlink: https://www.nti.org/education-center/treaties-and-regimes/treaty-conventional-armed-forces-europe-cfe/ (Last visit: 17.12.2022).

[639] See: Letter of Submittal – U.S. Secretary of State, pp. VI-VIII. in: US Congress (1997): Flank Document Agreement to the CFE Treaty, Hyperlink: https://www.congress.gov/105/cdoc/tdoc5/CDOC-105tdoc5.pdf (Last visit: 18.12.2022).

[640] Hayashi, M. (2013): Suspension of Certain Obligations of the CFE Treaty by NATO Allies: Examination of the Response to the 2007 Unilateral Treaty Suspension by Russia, pp. 132 f.

[641] See paragraph 5 in: NATO (2006): CFE Treaty's Contribution to Euro-Atlantic Security, Hyperlink: https://www.nato.int/cps/en/natolive/official_texts_54709.htm (Last visit: 17.12.2022).

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the transformed geopolitical situation in the Euro-Atlantic region since the end of the Cold War. An obvious part of the Russian *rationale* was derived from the Kremlin's negative perception of the two NATO Eastern enlargements of 1999 and 2004 in conjunction with its negatively perceived politico-military implications. In response to the Russian unilateral action of suspending the CFE Treaty and thereby changing the *status quo* of the conventional arms control landscape in the Euro-Atlantic region since 1992, NATO's reaction could be best circumscribed as a 'non-response' (Hayashi).[642]

Instead of reciprocally suspending the CFE Treaty as well, NATO's member states had chosen to approach this issue with Russia in different multi- and bilateral discussion formats with the hope to solving any difference through negotiations on the basis of mutual interest.[643] Suffice to say, these discussions did not lead to any changes in the Russian decision of the CFE Treaty's unilateral suspension and after a few years of negotiations, a group of like-minded Western CFE Treaty states eventually reacted in face of a violation of the CFE Treaty text by Russia:[644]

> "**Russia's unilateral "suspension**," since 2007, of its implementation of CFE – an action **not** viewed by the United States as **legally available under CFE** or under customary international law – continues to degrade confidence and transparency at a time when military transparency is needed most. […] In 2011, **in response to Russia's continuing "suspension**," the **United States**, along with the **21 NATO CFE States** Parties, Georgia, and Moldova, **ceased implementing CFE vis-à-vis Russia**." (US Department of State – 2020 Report)[645]

For the U.S., the majority of NATO allies, as well as Georgia and Moldova, the situation has been crystal clear: Following its unilateral suspension of the treaty in 2007, Russia has not been compliant to several aspects of the CFE Treaty, which, *inter alia*, encompassed the non-adherence to the subregional TLE restrictions as well as the forward deployment of Russian armed forces in other CFE countries without consent of the state involved. Lastly, Russia's occupation of parts of its neighbour Ukraine (namely, Crimea since 2014), has been a direct violation of CFE Treaty (Article IV, paragraph 5) as well.[646] Considering the latest 2022

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[642] Hayashi, M. (2013): Suspension of Certain Obligations of the CFE Treaty by NATO Allies: Examination of the Response to the 2007 Unilateral Treaty Suspension by Russia, pp. 133 f.
[643] NATO (2007): Alliance's statement on the Russian Federation's "suspension" of its CFE obligations, Hyperlink: https://www.nato.int/cps/en/natohq/news_15500.htm?selectedLocale=en (Last visit: 18.12.2022).
[644] Hayashi, M. (2013): Suspension of Certain Obligations of the CFE Treaty by NATO Allies: Examination of the Response to the 2007 Unilateral Treaty Suspension by Russia, pp. 134 f.
[645] US Department of State (2020): Compliance With the Treaty on Conventional Armed Forces in Europe (Condition (5) (C) Report) – 2020, p.1, Hyperlink: https://www.state.gov/wp-content/uploads/2020/06/Unclassified-2020-CFE-Condition-5C-Report-06.26.2020.pdf (Last visit: 18.12.2022).
[646] US Department of State (2020): Compliance With the Treaty on Conventional Armed Forces in Europe (Condition (5) (C) Report) – 2020, pp 7-10, Hyperlink: https://www.state.gov/wp-content/uploads/2020/06/Unclassified-2020-CFE-Condition-5C-Report-06.26.2020.pdf (Last visit: 18.12.2022); and: The Kennan Institute (2002): The 1999 OSCE Istanbul Summit Decisions on Moldova and Georgia:

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Russian invasion into Ukraine, together with the further revanchist moves by Russia to annex even more Ukrainian territory in the Donbass and southern Ukraine, a revitalisation of conventional disarmament in the Euro-Atlantic region through the CFE Treaty or another follow-on treaty appears ever more unlikely in the years, if not decades, to come.

Putting the CFE Treaty in a nutshell, it was extremely successful in the first five years of its existence, which has led to tremendous reductions in conventional military equipment and forces in Europe. Since the 1999 OSCE Istanbul summit, Western discontent with Russia's continuous military presence in neighbouring countries Georgia and Moldova[647] had grown to a 'showstopper' for the 'Adapted CFE Treaty' as the evolving next step in conventional disarmament and arms control in the Euro-Atlantic region. Still, it took another eight years until Russia decided to unilaterally 'suspend' the original CFE Treaty provisions, and for the majority of NATO member states additional three years to cease their obligations under the original CFE Treaty. Subsequently and from a deterrence perspective, the treaty's impact on the Russian conventional forces most likely began in the late 1990s and continued throughout the 2000s with the culmination point of Russia's unilateral suspension in 2007. As a consequence, the quantitative expectations for a conventional capability-related analysis would be that massive capability reductions occurred in NATO's member states and Russia in the initial post-Cold War period, while such momentum (potentially even reversal) emerged in the follow-on timeframes of the first and second decades of the post-Cold War era. Of course, this requires testing on the basis of the rDMC capabilities dataset in the next subchapters.

4.2.3 U.S.-Russian selected nuclear disarmament treaties since 1991

In demarcation to the CFE Treaty, which focussed on conventional capabilities in the two power groups of the Cold War in the post-Cold War era and thus encompassed all members of NATO and Warsaw Pact, the following six treaties relate to the strategic nuclear military balance between the U.S. and the USSR's prime successor state Russia. Those treaties are hereby discussed in three packages: Four treaties in this subchapter – START I and II as well as SORT and New START – concern the offensive strategic nuclear balance between the nuclear triads of the USSR and the U.S. in terms of land-based intercontinental ballistic missiles (ICBM), air-launched nuclear munitions delivered by heavy bombers, and submarine-launched ballistic

Prospects for Implementation, pp. 6-8, Hyperlink: https://www.files.ethz.ch/isn/19098/OP284.pdf (Last visit: 18.12.2022).

[647] For additional information on the post-Soviet presence of Russia in Georgia and Moldova, see: ACA (2007): Russia, West Still Split Over Georgia, Moldova, Hyperlink: https://www.armscontrol.org/act/2007-01/russia-west-still-split-over-georgia-moldova (Last visit: 18.12.2022).

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missiles (SLBM). The two further treaties are addressed in individual smaller packages in the next subchapter and consist of the 1987 INF Treaty and 1972 ABM Treaty, which cover specific offensive missile types (INF Treaty) and defensive ballistic missile defence systems (ABM Treaty) respectively. Both additional treaties have important implications for nuclear deterrence from a military capability point of view; hence there are a number of relational connections between this and the next subchapter.

Starting with the U.S./Russian bilateral nuclear arms control/disarmament, the first two out of four treaties were key milestone from the early post-Cold War transition period: START I, signed by the U.S. and the Soviet Union in July 1991[648], and START II, signed by the U.S. and Russia in January 1993[649]. As a logical evolution of the Cold War's SALT I and II Treaties that were the first mutually agreed deals between the U.S. and the Soviet Union to restrict the nuclear arms race between the two superpowers[650], START I and II were setting legally-binding ceilings for the two countries which had been lower than their arsenals at the time, thus requiring both signature parties to dismantle offensive nuclear capabilities.

Going briefly through the treaties from a chronological order, 1991 START I offered a comprehensive first successful attempt at reducing strategic nuclear arsenals, but required considerable efforts by the two states from both a disarmament as well as a deterrence point of view. The disarmament perspective had to calculate with the practical ability to physically dismantle missiles and warheads that required time and financial resource for realisation, while a certain quantity of nuclear warheads and delivery systems across the nuclear triad had to be retained from a deterrence perspective. Subsequently, any potential layer of a nuclear armament reduction activity had to be consistent with each other in order to avoid a temporary nuclear disbalance between both powers.[651]

It should be noted for a correct and complete historical context of 1991 START I that both strategic and tactical nuclear weapons had still been present in the non-Russian parts of the former Soviet Union, when the USSR collapsed at the end of 1991. These nuclear weapon-holding countries had been the non-signature parties Belarus, Ukraine and Kazakhstan. The 1992 Lisbon Protocol (1) enabled accession of those three countries to original U.S.-Soviet START I and (2) the same time committed the three countries to repatriate Soviet nuclear

[648] ACA (2022): START I at a Glance, Hyperlink: https://www.armscontrol.org/factsheets/start1 (Last visit: 18.12.2022).
[649] ACA (2022): START II and Its Extension Protocol at a Glance, Hyperlink: https://www.armscontrol.org/factsheets/start2 (Last visit: 18.12.2022).
[650] US Office of the Historian (n.a.): Strategic Arms Limitations Talks/Treaty (SALT) I and II, Hyperlink: https://history.state.gov/milestones/1969-1976/salt (Last visit: 27.12.2022).
[651] For more details on the complexity of nuclear disarmament on the basis of the START I Treaty, see: Owens, D./Parnell, G./Bivins, R. (1996): Strategic Arms Reduction Treaty (START) Drawdown Analyses, pp. 425-434.

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weapons to Russia. The last strategic nuclear weapons were delivered from Belarus to Russia in November 1996.[652] In the process of returning Soviet nuclear weapons from the Soviet successor states to Russia, the 1994 Budapest Memorandum was formulated in order give Ukraine desired security guarantees for the post-Cold War era by signature countries Russia, UK and U.S. The memorandum should ensure Ukraine's sovereignty after the return of the nuclear weapon arsenal to Russia.[653]

In comparison to the first treaty, 1993 START II had to offer considerable prospects for nuclear disarmament, such as the ban of multiple independently targetable re-entry vehicles (MIRV) from ICBM systems on top of further reductions in warhead quantities. Given that ground-based MIRV ICBMs had been the mainstay of Russia's strategic nuclear potential, an extremely costly adaption of Russia's nuclear triad was rather unpopular in a country that was undergoing financial crises. In addition, the provisions regarding the nuclear reductions favoured the U.S. side thanks to its limited reliance on the respective type of missile.[654] Furthermore, foreign policy events like the NATO's first eastward enlargement, the NATO air campaign against Russia's ally Serbia over Kosovo, and last but not least the U.S. unilateral withdrawal from the 1972 ABM Treaty heavily influenced the eventual failure of START II going-into-force, when Russia's President Putin decided to stop any further efforts on the treaty.[655]

At the time of the demise of START II, there had already been a 'back-up' option in place. The 2002 SORT Treaty was a lightweight arms limitation treaty with a maximum quantity of warheads per signature party but without further details on the national strategic force compositions (the stipulations of the START I Treaty that was signed a decade before SORT still remained in effect).[656] Given the short timeframe between the decision of the U.S. administration to leave the ABM Treaty (December 2001), the signature of SORT (May 2002), the U.S. withdrawal from the ABM Treaty and the subsequent Russian renunciation of START

[652] For additional details, including quantities of strategic and tactical nuclear weapons holdings as of 1991 in Belarus, Ukraine and Kazakhstan, see: ACA (2020): The Lisbon Protocol at a Glance, Hyperlink: https://www.armscontrol.org/node/3289 (Last visit: 18.12.2022).

[653] Since the annexation of Crimea by Russia in spring 2014, the empirical reality has shown that security guarantees on the basis of cooperative security agreements might not necessarily ensure military security of a state in general and of Ukraine in particular. As a reference to the memorandum, see paragraphs 1 and 2 of the 1994 Budapest Memorandum, in: UN (1994): Memorandum on security assurances in connection with Ukraine's accession to the Treaty on the Non-Proliferation of Nuclear Weapons, pp. 169 f., Hyperlink: https://treaties.un.org/doc/Publication/UNTS/Volume%203007/Part/volume-3007-I-52241.pdf (Last visit: 18.12.2022).

[654] Pikayev, A. (1999): The Rise and Fall of START II: The Russian View, p. 8 f., Hyperlink: https://carnegieendowment.org/files/Rise_Fall_StartII.pdf (Last visit: 27.12.2022).

[655] For a timeline of the events, see: ACA (2020): Brief Chronology of START II, Hyperlink: https://www.armscontrol.org/factsheets/start2chron (Last visit: 27.12.2022).

[656] ACA (2002): The Strategic Offensive Reductions Treaty (SORT) At a Glance, https://www.armscontrol.org/factsheets/sort-glance (Last visit: 27.12.2022).

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II the next day (both in June 2002), SORT offered a minimal bargaining compromise between U.S. and Russia to save the mutual acquisition of some nuclear military security, while the U.S. avoided giving in on the Russian 'bargaining chip' *or* 'tit-for-tat'[657] of enforcing START II in exchange for U.S. abandonment of deployment of a national ballistic missile defence system (US BMD).

It took a further eight years and a change in the U.S. administration in order to reinvigorate bilateral nuclear arms control between Russia and the U.S. The 2010 New START Treaty was an outcome of the White House's political 'reset' initiative since January 2009, through which the U.S. desired to 'normalise' relations with Russia following the 2008 Russo-Georgian War. With a perspective to lucky coincidences, in March 2008, the Kremlin had undergone a role swap between former President Putin, who was serving as Russia's Prime Minister 2008-2012, and one of his political aides, Dmitry Medvedev that was elected as Russia's President for the time period 2008-2012. The formal agreement between Russia and the U.S. on the critical issue of nuclear disarmament in the remit of the New START was principally a positive aspect also for NATO-Russia relations, since it provided a more stable politico-military backdrop for the transatlantic alliance's discussions on preserving military security of its members especially the increasing tensions between Russia and the alliance due to NATO's discussion on the membership perspectives for Georgia and Ukraine at the 2008 Bucharest Summit.[658]

After treaty ratifications took place, both countries' representatives continued to explore further disarmament steps that quite quickly reached a dead end due to Russia's unaccommodated concerns regarding missile defence and the continuous foreign policy divide between the U.S. and Russia in other world regions, for example in regard to Libya. Lastly, again with the Russian annexation of Crimea, retaining arms control efforts had been made difficult as never before in the post-Cold War era.[659]

In line with Wolfsthal, the four presented treaties between the U.S. and Russia were milestone in a continuous period of bilateral nuclear arms control and disarmament that already started in the Soviet times of the Brezhnev era and lasted till mid-time of then-Russian President Medvedev in office.[660] It is therefore quite remarkable that U.S/Soviet/Russian nuclear arms control are in principle usable for a comprehensive analysis covering both the Cold War and

[657] Using arms control and disarmament treaties in order to further national politico-military interests has been a common tool in foreign and security policy since the Cold War. For a brief conceptual outline with Cold War examples of bargaining chips that remain relevant till today, see: Bresler, R./Gray, R. (1977): The Bargaining Chip and SALT, pp. 65-85.

[658] Roberts, K. (2013): Putin's Choice: The Russian President and the Reset, pp. 127-132.

[659] Pifer, S. (2015): US-Russia Relations in the Obama Era: From Reset to Refreeze?, pp. 114 f. and 120 f. In: *IFSH (ed.), OSCE Yearbook 2014, 2015*.

[660] Wolfsthal, J. B. (2020): Why Arms Control?, p. 102.

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post-Cold War time. In regard to U.S./Soviet nuclear arms control, there were obviously ups and downs throughout those years, particularly when considering the nuclear arms race in the 1980.[661] But what is most interesting from a nuclear deterrence perspective is the waning of efforts from both Russia and the U.S. in cooperative security that began speeding up since the 2000s. As of 2022, the key milestone treaties of nuclear (and conventional) arms control/disarmament were either expired or one or both states had withdrawn from them.[662] Thus, the New START Treaty has become the last remnant of the once comprehensive U.S/Russian nuclear arms control framework. Considering that the treaty was set to expire in February 2021, the two signature parties agreed to expand the duration for five further years until February 2026.[663]

Summarising the deterrence-relevant aspects from the four treaties just introduced, there are three compromising factors that must be taken into account. (1) The shown arms control and disarmament treaties for offensive nuclear arms have a limited scope in terms of participants (with exemption of START I, the U.S. and Russia only), thus not every nuclear power is a signatory bound to the respective treaty, (2) there is an expiration date for most of the treaties, by when it is reached (hopefully) a follow-on treaty would be signed, and (3) ceilings for strategic nuclear arms reductions are defined on complex military capabilities in terms of warheads as well as missile/launcher systems. Table 32 displays this information for either party across the four bilateral nuclear reduction treaties of the post-Cold War era.

<table>
<tr><th></th><th>START I</th><th>START II*</th><th>SORT</th><th>New START</th></tr>
<tr><td>Expiration date</td><td>Dec. 2009</td><td>n/a</td><td>Dec. 2012 (superseded by New Start)</td><td>February 2021 (Extended till February 2026)</td></tr>
<tr><td colspan="5">Missiles/Launcher systems:</td></tr>
<tr><td>ICBM
SLBM
Heavy bombers</td><td rowspan="2">1.600 (thereof max. 154 heavy ICBM)</td><td rowspan="2">Limits based on warheads deployed on ICBM/SLBM/ Heavy bombers</td><td rowspan="2">No defined limits</td><td rowspan="2">700 (with an additional limit of 800 non-deployed and deployed delivery systems)</td></tr>
<tr><td colspan="4">Warheads:</td></tr>
</table>

[661] For reference, see a comprehensive timeline of U.S./Soviet/Russian arms control and disarmament: Hyperlink: CFR (n.a.): U.S.-Russia Nuclear Arms Control 1949-2021, https://www.cfr.org/timeline/us-russia-nuclear-arms-control (Last visit: 27.12.2022).

[662] Carnegie Europe (2020): Why Arms Control Is (Almost) Dead, Hyperlink: https://carnegieeurope.eu/strategiceurope/81209 (Last visit: 10.12.2022).

[663] US State Department (2022): New START Treaty, Hyperlink: https://www.state.gov/new-start/ (Last visit: 27.12.2022); and Vaddi, P./Blanchette, N./Hinck, G. (2019): What Happens If the Last Nuclear Arms Control Treaty Expires?, Hyperlink: https://carnegieendowment.org/publications/interactive/new-start (Last visit: 27.12.2022).

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ICBM SLBM Heavy bomber armaments	6.000 (thereof max. 4.900 for ICBM/SLBM; max. 1.100 for mobile ICBM; max. 1.540 for heavy ICBM)	3.800-4.250 (by 2004) 3.000-3.500 (by 2007)	1.700-2.200	1.550

** The START II Treaty never went into force.*

Table 32: Main provisions of the U.S./Russian nuclear disarmament treaties[664]

Counting warheads as shown above is, however, not a simple mathematical exercise, but a complex undertaking that requires scrutiny by each side in order to ensure nuclear strategic balance.

Whereas ICBMs are principally missile systems launched from an hardened underground silo, (one missile with one more warhead per missile; current active 'lead' is the Russian RS-20 (RS-36) with 10 MIRV warheads[665]), SLBM require a (predominantly nuclear-powered) large submarine, which could carry e.g. up to 24 SLBM with 12 MIRV warheads (or 20 SLBM with 8 MIRV warheads under 2010 New START conditions) in case of the U.S. Ohio-class SSBN.[666] Lastly the payloads of a heavy bombers are comparably smaller, such as Russia's main bomber *Bear H* that can carry up to 15 nuclear tipped air-launched cruise missiles (ALCM).[667]

For an overview of the U.S./Russian strategic nuclear missile/heavy bomber 'landscape', including a comparison between early post-Cold War and the 2010 Obama/Medvedev administration perspective, the following Table 33 provides some basic overview. It should be noted that ICBM, SLBM and Heavy bomber armaments are reflected as individual missile

[664] NTI (n.a.): Treaty between the United States of America and the Union of Socialist Soviet Republics on the further Reduction and Limitation of Strategic Offensive Arms (START I), pp. TSTARTI-1 f., Hyperlink: https://media.nti.org/documents/start_1_treaty.pdf (Last visit: 19.12.2022); Article 1 on: US Department of State (1993): Treaty Between the United States of America and the Russian Federation on Further Reduction and Limitation of Strategic Offensive Arms (START II), Hyperlink: https://2009-2017.state.gov/t/avc/trty/102887.htm#treatytext (Last visit: 27.12.2022); NTI (n.a.): Treaty between the United States of America and the Russian Federation on Strategic Offensive Reductions (SORT/Treaty of Moscow), p. TSORT-1, Hyperlink: https://media.nti.org/documents/sort_moscow_treaty.pdf (Last visit: 27.12.2022); and NTI (n.a.): Treaty between the United States of America and the Russian Federation on Measures for the further Reduction and Limitation of Strategic Offensive Arms (New START), p. 2, Hyperlink: https://www.nti.org/wp-content/uploads/2021/09/new_start_treaty.pdf (Last visit: 19.12.2022).

[665] Missile Threat (2021): R-36 (SS-18 "Satan"), Hyperlink: https://missilethreat.csis.org/missile/ss-18/ (Last visit: 27.12.2022).

[666] US Pacific Fleet (n.a.): Submarine Force Pacific – Ballistic Missile Submarines (SSBNs), Hyperlink: https://www.csp.navy.mil/SUBPAC-Commands/Submarines/Ballistic-Missile-Submarines/ (Last visit: 27.12.2022), and: Missile Threat (2021): Trident D5, Hyperlink: https://missilethreat.csis.org/missile/trident/ (Last visit: 27.12.2022).

[667] Center for Arms Control and Non-Proliferation (2022): Fact Sheet: Russia's Nuclear Inventory, Hyperlink: https://armscontrolcenter.org/wp-content/uploads/2022/09/Russias-Nuclear-Inventory-091522.pdf (Last visit: 27.12.2022).

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systems. Heavy bombers are different missile systems and submarines with strategic nuclear weapon arsenals are not covered at all (submarines can be considered indirectly limited based on the numerical restrictions of SLBM). Furthermore, it should also be understood that the designations for Russian missiles might be inconsistent (e.g., the RS-20 also known as RS-36), while NATO uses its own set of publicly available codenames with catchy designations (SS-18 'Satan').[668]

	1991 START I		*2010 New START*	
Missiles/Launcher systems	U.S.	Russia*	U.S.	Russia*
ICBM (fixed)	Minuteman II Minuteman III	RS-10 RS-12 RS-16 RS-18 RS-20	Minuteman II Minuteman III	RS-18 RS-20 RS-24
ICBM (mobile)	Peacekeeper	RS-22 RS-12M	Peacekeeper	RS-12M, RS-12M2
SLBM	Poseidon Trident I Trident II	RSM-25 RSM-40 RSM-50 RSM-52 RSM-54	Trident II	RSM-50 RSM-52 RSM-54 RSM-56
Heavy bombers	B-52 B-1 B-2	Tu-95 Tu-160	B-52G B-52H B-1B B-2A	Tu-95MS Tu-160
Heavy bomber armaments	AGM-86B AGM-129	AS-15A AS-15B	*Not indicated*	*Not indicated*

** Russia's missile designations were drawn from official treaties.*

Table 33: 1991 <-> 2010 comparison of U.S./Russia's strategic nuclear arms profile[669]

This short display of different categories of nuclear-tipped missiles and heavy bombers in a strategic nuclear deterrence role shows three important aspects: (1) Both countries retained the nuclear triad active throughout the two decades of the post-Cold War timeframe, (2) some missile types disappeared on either one of both sides due to obsolescence, while other missile

[668] A good source for the various designations of Russia's missiles, including the respective NATO codenames, which are more commonly known and used in Western literature, can be found on: Missile Threat (2021): Missiles of Russia, Hyperlink: https://missilethreat.csis.org/country/russia/ (Last visit: 27.12.2022).

[669] NTI (n.a.): Treaty between the United States of America and the Union of Socialist Soviet Republics on the further Reduction and Limitation of Strategic Offensive Arms (START I), p. TSTARTI-6, Hyperlink: https://media.nti.org/documents/start_1_treaty.pdf (Last visit: 19.12.2022); and NTI (n.a.): Treaty between the United States of America and the Russian Federation on Measures for the further Reduction and Limitation of Strategic Offensive Arms (New START), p. 3, Hyperlink: https://www.nti.org/wp-content/uploads/2021/09/new_start_treaty.pdf (Last visit: 19.12.2022).

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types and heavy bombers were either sustained or modernised, and (3) very few new missile types were inaugurated throughout the post-Cold War era (such as the RSM-56[670]).

Against this backdrop and from a deterrence perspective, it can be assumed that robust and thoughtful strategic nuclear defence planning is required in order to ensure that the capabilities required for a credible nuclear deterrent remain available to the respective nuclear defender and challenger. It is sufficient to say that this challenge might have been even bigger for a nuclear-armed defender, such as the U.S., which needs to cater for all kind of scenarios, under which it would be required to defend his protégés through nuclear means. Even though nuclear deterrence and defence had been categorised as a pure public good, at least on player needs to spend financial and personnel resources on the nuclear technology and capability deployment.

4.2.4 The 1987 INF Treaty and the 1972 ABM Treaty

For the last two bilateral treaties between the U.S. and Russia, which played an essential role in U.S.-Russia as well as NATO-Russia relations in terms of nuclear deterrence, a return to the Cold War era is required.

Preceding the first U.S./Russian post-Cold War disarmament treaty (START I) by a few years, the 1987 Treaty on the Elimination of Intermediate-Range and Shorter-Range Missiles (INF Treaty) had been a particular 'landmark arms-control and disarmament treaty' (Kühn/Peczeli)[671] between the USSR and the U.S., which brought an end of a whole class of ground-launched nuclear missiles with ranges between 500-5.500 km.[672] The ban included also possession, production and testing of those missiles. Understanding the importance of the INF Treaty requires some politico-military context of the INF Treaty's signing. The reason of NATO's discontent regarding the Soviet nuclear activities in the mid- to late-1970s had been Soviet deployment of the SS-20 IRBMs, which were considered a direct threat against NATO's member states in Europe as well as NATO's military forward deployed forces in Germany. NATO responded by the famous "Dual-Track" policy, wherein the U.S. began deployment of its own nuclear-tipped Cruise Missiles and Pershing II IRBMs in Europe while NATO offered

[670] Missile Threat (2021): RSM-56 Bulava (SS-N-32), Hyperlink: https://missilethreat.csis.org/missile/ss-n-32-bulava/ (Last visit: 27.12.2022).
[671] Kühn, U./Peczeli, A. (2017): Russia, NATO, and the INF Treaty, p. 66.
[672] For details on the INF Treaty, see: NTI (n.a.): Treaty on the Elimination of Intermediate-Range and Shorter-Range Missiles between USA and USSR (INF Treaty), pp. TINF-1 to TINF-10, Hyperlink: https://media.nti.org/documents/inf_treaty.pdf (Last visit: 04.12.2022).

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negotiations for an arms control agreement.[673] This arms control agreement was eventually the INF Treaty, which was signed by the U.S. and USSR in 1987.

From a technological perspective, it is essential to understand that the INF Treaty addressed two different kinds of missile technologies, namely ballistic and cruise missiles. The difference between both is the duration of propulsion and flight track. Ballistic missiles are launched with support of a rocket engine (boost phase) to a certain height, which depends on the size of the missile (fuel) and intended flight range. At a certain hight, the rocket engine stops firing and the missile pursues its trajectory path, therein usually leaving the earth atmosphere. When earth gravity begins to reattract the missile and/or individual (MIRV) warhead downward, the terminal phase begins until the warhead detonates at or above its target. In comparison to ballistic missiles, those that use cruise technology behave similar to jet aircraft. They do not leave the earth atmosphere and can be guided to their target using different guidance systems, such as the U.S. Global Positioning System (GPS). Due to their flexible flight path, manual distance control and capability of flying at low heights, it is much more unpredictable for an adversary to track and to intercept in both first- and second-strike roles. Ground-launched cruise missiles were banned under the INF Treaty, while conventionally armed air- and sea-launched cruise missiles, such as the U.S. Tomahawk, were still allowed and also saw practical use in the U.S. armed forces in post-Cold War conflicts, e.g. in the 1991 Gulf War or the 2003 Iraq War.[674] From a deterrence point of view, the mutual abolition of ground-launched cruise missiles (GLCM), ground-launched ballistic missiles (GLBM) with ranges of 1.000-5.500 km as well as shorter-range missiles with ranges 500-1.000 km completely removed U.S. and Russia's ground-launched nuclear deterrence capabilities, thus severely reducing the credibility of nuclear threats by Russia, which in turn would have been limited to the European theatre of operations. For the timeframe under examination of this dissertation, 1992-2016, the INF Treaty had still been in effect, but its devaluation had already begun by the mid-2000s, when Russia appeared to question the Russian continued adherence to the INF Treaty in reaction to the U.S.' development and deployment of its NMD system.[675]

[673] NTI (2019): The Intermediate-Range Nuclear Forces (INF) Treaty at a Glance, Hyperlink: https://www.armscontrol.org/factsheets/INFtreaty (Last visit: 17.12.2022); and: NATO-SHAPE (n.a.): 1979-1989: "Dual Track" Decade - New Weapons, New Talks, Hyperlink: https://shape.nato.int/page214610458 (Last visit: 17.12.2022).

[674] Center for Arms Control and Non-Proliferation (2017): Fact Sheet: Ballistic vs. Cruise Missiles, Hyperlink: https://armscontrolcenter.org/wp-content/uploads/2017/04/Ballistic-vs.-Cruise-Missiles.pdf (Last visit: 18.12.2022).

[675] Audenaert, D. (2019): The End of the INF-Treaty: Context and Consequences, pp. 2-4, Hyperlink: https://www.egmontinstitute.be/app/uploads/2019/07/SPB111.pdf (Last visit: 17.12.2022).

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First information on Russia's SSC-8/9M729 nuclear-capable intermediate-range cruise missile development, considered by the U.S. to be in breach of the INF Treaty's agreed range limitations, came to light since 2008, while the first Russian test firing occurred in July 2014.[676] The foreign ministers of the 28 NATO member states declared their solidarity with the U.S. and urged Russia to comply with the provisions of the INF Treaty in December 2018. However, this step was to no avail, as the INF Treaty eventually met its end in February 2019 after the U.S. administration of President Trump withdrew from the treaty in reaction the deployment of the SSC-8 by Russia, considered to be a direct breach of the range-limitations from the INF Treaty. There were multiple factors involved in this decision by the Trump administration, amongst which the Russian development and deployment of the ground-launched SSC-8 was only the 'fuse'. For Russia, the development of the NATO BMD had been an important counter-argument, as the Kremlin believed that NATO was actually in breach of the INF Treaty. Furthermore, both Russia and U.S. had been quite observant of the proliferation of intermediate-range missiles to other state that were not bound by the ban of intermediate-range missiles, such as North Korea, Iran, India, Pakistan and last but not least the U.S. most likely future rival China. Given that those other non-restricted powers were neither willing nor open for restrictions on their respective missile arsenals akin to the conditions of the INF Treaty, it might not have been the worst outcome for the U.S. (and for its NATO allies) from a national (and extended) deterrence-point of view to leave this treaty behind.[677]

Summarising the conceptual context of the 1987 INF Treaty, the combination of the physical deployment of the Soviet SS-20, the subsequent U.S. response by deploying Pershing II in Germany with a view to offering the Soviet Union a deal on the mutual removal of those 'missiles from the same class' provided a prime example for using military capabilities as a – albeit financially very costly – 'bargaining chip'.[678]

Such an approach, namely giving up technical advances for military security gains, has not been without precedent throughout the Cold War, as this had already been achieved in limiting ABM systems since 1972, even though the U.S. promoted Safeguard ABM system at the time did not have the vast capabilities that the U.S. administration publicly proclaimed. In that sense, a player offering military capabilities used as 'bargaining chips' could also represent a 'bluff

[676] Missile Threat (2022): 9M729 (SSC-8), Hyperlink: https://missilethreat.csis.org/missile/ssc-8-novator-9m729/ (Last visit: 09.12.2022).
[677] Anderson, J./Nelson, A. (2019): The INF Treaty: A Spectacular, Inflexible, Time-Bound Success, pp. 102-106.
[678] For additional military and technical background on the SS-20 and Pershing II, see: Missile Threat (2021): RSD-10 Pioneer (SS-20), Hyperlink: https://missilethreat.csis.org/missile/ss-20-saber-rsd-10/ (Last visit: 27.12.2022); and: Missile Threat (2021): Pershing 2, Hyperlink: https://missilethreat.csis.org/missile/mgm-31b-pershing-2/ (Last visit: 27.12.2022).

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strategy' in order to turn a costly or limited-use military output in a beneficial outcome, such as the signature of the SALT I agreement.[679]

The core of the relationship between different types of nuclear missiles and respective ABM systems relates directly to the historic 'offence-defence' dichotomy of military capabilities, wherein weapons and protective equipment undergo constant advancement in order to overcome 'the other side'. With the advent of the nuclear age, the balance between offence and defence was considered shifting in favour of offence to such an extent that the best defence was considered the best offence; hence the mutually assured destruction (MAD) concept rose to prominence. Nevertheless, defensive missile research and development continued in both, the U.S. and the USSR, throughout the Cold War. From a technological perspective, ABM systems have to overcome continuous hurdles, such as the basic ability to destroy incoming nuclear strikes, remaining effective in view of 'saturation strikes' (i.e. more incoming missiles than the ABM system can protect against), identifying incoming warheads amongst decoys and counter-measures of MIRV warheads.[680] Though, the tackling of those challenges was the essential motivation from a U.S. point of view to develop a counter-system, because the country faced the proliferation of nuclear weapon technology to the People's Republic of China as well as the development of MIRV technology by the Soviet Union at the time.[681]

For understanding the concepts behind ABM, it is useful to have a reliable definition of ABM, which can be derived from the ABM Treaty, which was signed by the U.S. and the USSR in 1972. In that regard, an

> "ABM system is a system to counter strategic ballistic missiles or their elements in flight trajectory" (1972 ABM Treaty – Article II)[682]

Furthermore, an ABM system consists of interceptor missiles, their respective launchers and radars required to track incoming missile strikes.[683]

The original ABM Treaty allowed the U.S. and Soviet Union two ABM sites with 100 missiles per side; one for protecting the national capital against a counter-value first or second strike, the other for limited protection of the offensive ICBM launch silos in range of the ABM system

[679] Bresler, R./Gray, R. (1977): The Bargaining Chip and SALT, pp. 70-72.
[680] Flax, A. (1985): Ballistic Missile Defense: Concepts and History, pp. 33-39.
[681] McDonough, D. (2005): Nuclear Superiority or Mutually Assured Deterrence: The Development of the US Nuclear Deterrent, pp. 820 f.
[682] NTI (n.a.): Treaty between the United States of America and the Union of the Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems (ABM Treaty), p. TABM-1, Hyperlink: https://media.nti.org/documents/abm_treaty.pdf (Last visit: 10.12.2022).
[683] See Article II in: NTI (n.a.): Treaty between the United States of America and the Union of the Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems (ABM Treaty), p. TABM-1, Hyperlink: https://media.nti.org/documents/abm_treaty.pdf (Last visit: 10.12.2022).

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in case of a counter-force first strike.[684] On the basis of a follow-on protocol in 1974, the ABM sites permitted were reduced to one, whereby each side had to decide, which site to keep. The USSR opted for the Moscow ABM system, whereas the U.S. preferred their ICMB protection system in North Dakota, which was shut down after minimal delay due to the financial burden in comparison to the added value of the system.[685]

Nevertheless, respective national leaderships of both sides were willing to explore ways to defend their national territory against nuclear strikes, while remaining compliant to the ABM Treaty's obligations. As many international agreements, the textual understanding and interpretations of the treaty text has been challenged more than once. In the 1980s, when the U.S administration under President Reagan launched the SDI project, compliance with the ABM Treaty was a topic that, by all means, did not stop President Reagan from pressing for SDI.[686] In the 1990s, the issue of ballistic missile defence systems in conjunction with ABM compliance resurfaced, when the U.S. administration of President Clinton pursued a scaled-down ground-based national missile defence system, which was intended as an ABM-compliant theatre-based missile defence system (TMD)[687] against the midcourse trajectory of short- and medium-range missile rather than a BMD that protects the U.S. against transcontinental ICBM strikes through targeting ICBM in their boost phase, i.e. directly after launch and before any MIRVed missile might disperse its warheads.[688]

The main driver of the later BMD system of the U.S. administration under President H.W. Bush had been the perceived threat from rogue states, like North Korea and Iran, who were developing different missile types with ever increasing ranges and the potential for developing nuclear weapons (which North Korea started realising with its first nuclear test in October 2006[689]). While the U.S. solution for particular those two state threats has been the national

[684] See Article III in: NTI (n.a.): Treaty between the United States of America and the Union of the Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems (ABM Treaty), p. TABM-2, Hyperlink: https://media.nti.org/documents/abm_treaty.pdf (Last visit: 10.12.2022).

[685] See: US Department of State (1974): Supplementary Protocol to the Protocol on Procedures Governing Replacement, Dismantling or Destruction, and Notification thereof, for ABM Systems and their Components, Hyperlink: https://2009-2017.state.gov/t/avc/trty/101888.htm#supplementary (Last visit: 27.12.2022), and: ACA (2020): The Anti-Ballistic Missile (ABM) Treaty at a Glance, Hyperlink: https://www.armscontrol.org/factsheets/abmtreaty (Last visit: 27.12.2022).

[686] Sofaer, A. (1986): The ABM Treaty and the Strategic Defense Initiative, pp. 1980-1985.

[687] The difference between a TMD and a BMD were mutually agreed in a demarcation agreement to the ABM Treaty in September 1997, see: ACA (2020): The Anti-Ballistic Missile (ABM) Treaty at a Glance, Hyperlink: https://www.armscontrol.org/factsheets/abmtreaty (Last visit: 27.12.2022), and: US Department of State (1997): Standing Consultative Commission Documents, Hyperlink: https://2009-2017.state.gov/t/avc/trty/101888.htm#sccdocuments (Last visit: 28.12.2022).

[688] Coyle, P./Rhinelander, J. (2001): National Missile Defense and the ABM Treaty: No Need to Wreck the Accord, pp. 16-20.

[689] See chronological entry for 9. October 2006, on: ACA (2022): Chronology of U.S.-North Korean Nuclear and Missile Diplomacy, Hyperlink: https://www.armscontrol.org/factsheets/dprkchron (Last visit: 28.12.2022).

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BMD system, it would technically not be possible to provide extended active deterrence in the form of missile defence against attacks on the European allies due to the geographical stationing of the interceptor missiles.[690] While it is suffice to say that this issue in conjunction with the joint U.S./NATO solution – known as the European Phased Adaptive Approach (EPAA)[691] – is addressed in the later subchapter 4.5 and 4.6, the most important aspect of the 1972 ABM Treaty had been its eventual failure through the U.S. unilateral withdrawal in 2002, which was responded by Russia with abandonment of the START II Treaty.

Acton, a member of the U.S.-based think tank Carnegie Endowment for International Peace, has conducted a review of the 2002 U.S. withdrawal the ABM Treaty in 2021 and concluded that a new nuclear arms race was quintessentially considerably sparked by that unilateral action. While the U.S. BMD system's efficacy must still pass a reality test, Russia (and China) began the development of new or modernised missiles with MIRV warheads that had already been a challenge for the Cold War-era BMD systems that were not able to withstand a comprehensive overwhelming nuclear attack.[692] So, in a nutshell, the ABM Treaty served its purpose, while leaving enough loopholes in the treaty text to allow for further technological development of missile interception capabilities, be it sea- or land-based TMD or laser weapon technology as part of the SDI programme. And lastly, Western impressions of the 2022 Russian invasion in Ukraine make the return of the ABM Treaty a most unlikely prospect.[693]

4.2.5 NATO-Russia relations and the 1997 NATO-Russia Founding Act

For the analysis of the relations between NATO and Russia in the post-Cold War era, the timeframe 1992-2016 is separated in four phases, namely (1) 1992-1993, (2) 1994-1996, (3) 1997-2013, and (4) 2014-2016+. In view of the complex historical context in which NATO's relations to Russia are embedded (including several special bilateral relationships, such as

[690] Obering, H. (2007): European Missile Defense: The View from the Pentagon, Hyperlink: https://www.armscontrol.org/act/2007-10/features/european-missile-defense-view-pentagon (Last visit: 28.12.2022).

[691] A reoccurring topic for EPAA in particular and NATO BMD as a concept in general is the acquisition of additional military security from non-European missile threats, while not jeopardising the strategic balance with the potential nuclear-armed challenger Russia. See: Sankaran, J. (2013): Missile Defense Against Iran Without Threatening Russia, Hyperlink: https://www.armscontrol.org/act/2013-11/missile-defense-against-iran-without-threatening-russia (Last visit: 28.12.2022).

[692] Acton, J. (2021): "The U.S. Exit from the Anti-Ballistic Missile Treaty has fueled a New Arms Race", Commentary, Hyperlink: https://carnegieendowment.org/2021/12/13/u.s.-exit-from-anti-ballistic-missile-treaty-has-fueled-new-arms-race-pub-85977 (Last visit: 28.12.2022).

[693] For example, Germany spearheaded the most recent 'European Sky Shield initiative', which received support by 13 NATO allies. The initiative has been designed in view of Russia's intensive missile strikes on Ukraine and aspires to boost NATIMADS through short-, medium-, and long-range missile defence. See: NATO (2022): 14 NATO Allies and Finland agree to boost European air defence capabilities, Hyperlink: https://www.nato.int/cps/en/natohq/news_208103.htm (Last visit: 28.12.2022).

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between Russia and the US, Russia with a reunified Germany, or Russia with its former Eastern bloc partners), the phases (1) and (2) are only briefly touched upon in order to gain a basic understanding of the conditions that led to the initiation of phase (3) of the NATO-Russia relations in the post-Cold War era (1997-2013).

Phase (3) constitutes the central part of this subchapter and is based on the key document "Founding Act on Mutual Relations, Cooperation and Security between NATO and the Russian Federation" *also known as* the NATO-Russia Founding Act of 1997.

Lastly, phase (4) serves as a brief outro, because NATO's relations just began to enter a new 'ice age' in reaction to Russia's illegal annexation of Crimea and its proxy war in Donbass since 2014, which continued at least to the end of the research period 2016.

The first phase (1992-1993) encompassed NATO's relations with Russia in the early post-Cold War era. In the initial part of this phase, NATO's member states began to open formal communication channels towards the states from former Warsaw Pact at first and then the successor states of the USSR as well by creating the North Atlantic Cooperation Council (NACC) in December 1991. Coincidentally, it was at the inaugural meeting of the very first NACC in December 1991, when the USSR had declared its own dissolution (this historical record was briefly mentioned in the political context from subchapter 1.1). In its mandate, the NACC covered a comprehensive range of Cold War transition phase issues from a politico-military perspective, such as the removal of Soviet troops from the Eastern bloc states' territories and eventually the former Soviet republics that became independent and sovereign states. The NACC as institutionalised committee of cooperative security between NATO's member states and former Warsaw Pact third states lasted until 1997, when it got eventually replaced by the Euro-Atlantic Partnership Council (EAPC).[694]

In the second phase (1994-1996), the relations between NATO and Russia grew more mature when that third states became the first participant of NATO's 'Partnership for Peace' (PfP), which was launched in 1994. The PfP is a comprehensive bilateral NATO-third state cooperation programme which aims at intensifying practical cooperation at the political and military level, mutual trust- and confidence-building, interoperability for conducting joint peacekeeping operations, civil emergency response or joint scientific research of security- and defence-related technologies.[695]

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[694] NATO (2022): North Atlantic Cooperation Council (1991-1997), Hyperlink: https://www.nato.int/cps/en/natohq/topics_69344.htm (Last visit: 11.01.2023).

[695] NATO (2022): Partnership for Peace programme, Hyperlink: https://www.nato.int/cps/en/natohq/topics_50349.htm (Last visit: 11.01.2023); Paragraphs 13-16 in: NATO (1994): Brussels Summit Declaration, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_24470.htm?mode=pressrelease (Last visit: 11.01.2023); and:

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Both the NACC and the bilateral Partnership for Peace programmes were important milestones for NATO's evolution from its origins as the Cold War politico-military alliance to an international organisation, which provides venues for cooperation with non-member states. At the same time, the establishment of the PfP raised hopes by several Eastern European states to become eventual members of NATO at some point in the not-so-distant future if they would just perform in their own bilateral programmes with NATO. From 1993 onward till the mid-1990s, the issue of enlarging NATO in view of Russia's security concerns of having their Cold War-rival alliance moving closer to its territory were of continuous concern in the U.S., the key stakeholder in the transatlantic alliance, as well as in the European member states. It should be noted that the NACC and PfP were no formats exclusively for Russia, but rather addressing larger security-related questions arising from the geopolitical shift in the Eastern bloc in conjunction with potential instability, which might arise from failed or delayed reform processes.[696]

NATO enlargement manifested only slowly and was accompanied by a thorough discussion in policy-making circle particularly in the alliance's key member state (defender), the U.S.[697]. In 1994, the Clinton administration took a decisive step in their wording regarding the prospect of NATO enlargement to include Eastern Europe for reasons that should not be further addressed at this point[698]; and neither examined should be the various benefits and risks that were intensively discussed in policy decision-making circles in NATO's member states.[699]

A central aspect toward the phase (3) had been the strategy that was used by NATO and the U.S. to successfully achieve some sort of "buy-in" or at least tolerance from then-Russian President Yeltsin for NATO's eastern enlargement. In a memorandum to President Clinton, written by then-U.S. Deputy Secretary of State Strobe Talbott, prophetically titled "The Moment of Truth", the U.S. bargaining strategy of politically pressuring Russia by setting

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NATO (2020): NATO-Russia Relations: The Background, p.1, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/2020/4/pdf/2003-NATO-Russia_en.pdf (Last visit: 11.01.2023).

[696] Borawski, J. (1995): Partnership for Peace and beyond, pp. 233-246.

[697] There is an account of primary sources on high-level political discussions regarding NATO's Eastern enlargement that occurred in the years of U.S. President Clinton is available in the Clinton Presidential Library. For reference, see the historical processing in: Kieninger, S. (2020): New Sources on NATO Enlargement from the Clinton Presidential Library, Hyperlink: https://www.wilsoncenter.org/blog-post/new-sources-nato-enlargement-clinton-presidential-library (Last visit: 22.10.2022).

[698] U.S. diplomat Asmus related the U.S. positive response towards NATO enlargement to Clinton's personal idealistic perspective on the post-Cold War order. See: Jires, J. (2003): Review: The Heyday of Multilateralism: Clinton Administration and NATO Enlargement, pp. 75 f.

[699] The record and critical review from a public hearing in the U.S. Congress in 1997 could be taken as a quick reference guide to the arguments exchanged on NATO enlargement at the time. See: ACA (1997): The Debate Over NATO Expansion: A Critique of the Clinton Administration's Responses to Key Questions, Hyperlink: https://www.armscontrol.org/act/1997-09/features/debate-over-nato-expansion-critique-clinton-administrations-responses-key (Last visit: 11.01.2023).

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incentives like a parallel NATO-Russia dialogue and additional political guarantees that the enlargement would not constitute a threat to Russia. On the other side, Russia has made it clear that NATO enlargement was actually seen as a threat towards Russia and as a risk factor for an undivided Europe. However, the Russian side was afraid that NATO might just continue the NATO-enlargement time schedule and it would be left at the sidelines without any gains as a trade-off if NATO proceeded.[700] The summary report on the bilateral meeting between Presidents' Yeltsin and Clinton in the Kremlin in May 1995, which was held after Clinton had received "The Moment of Truth" memorandum, provides an example of a diplomatic hard stance in a bargaining situation. When Yeltsin asked for a postponement of NATO enlargement to the year 2000, Clinton remained steadfast by referring to the complexity of the enlargement process, the time schedule in NATO, and the united will of NATO to execute these plans. At last, Yeltsin was eventually giving in by agreeing to sign the necessary documents for launching the NATO-Russia dialogue.[701]

By 1995, the discussions on NATO's enlargement for including former Warsaw Pact member gained public *momentum*, after NATO conducted a study on the enlargement's potential purpose, added value, politico-military expectations regarding the potential new members, tasks for the old member states in order to get the new ones' on board, and the persistent issue of Russia's security concerns evoked by enlarging the military alliance to eventually adjacent territory.[702] The study did not yet mention any concrete candidate countries, but it was quite outspoken about Russia's concerns that NATO had to properly address in order to avoid any deterioration of the security environment in Eastern Europe:

> "**Russia has raised concerns with respect to the enlargement process of the Alliance**. The **Alliance is addressing these concerns** in developing its **wider relationship with Russia** and the Alliance has made it clear that the **enlargement process including the associated military arrangements will threaten no-one and contribute to a developing broad European security architecture** based on true cooperation throughout the whole of Europe, enhancing security and stability for all." (1995 Study on NATO Enlargement)[703]

[700] National Security Archive (1995): Strobe Talbott Memorandum to the President: The Moment of Truth, 15. April 1995, pp. 1-7, Hyperlink: https://nsarchive.gwu.edu/document/27170-doc-16-strobe-talbott-memorandum-president-moment-truth (Last visit: 11.01.2023).

[701] National Security Archive (1995): Memorandum of Conversation between President Clinton and President Yeltsin, Kremlin, Moscow, 10. May 1995, pp. 6-12, Hyperlink: https://nsarchive.gwu.edu/document/27172-doc-18-memorandum-conversation-between-president-clinton-and-president-yeltsin (Last visit: 11.01.2023).

[702] For the role of the NACC and PfP for the NATO enlargement process, see paragraphs 31-41 in: NATO (1995): Study on NATO Enlargement, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_24733.htm (Last visit: 11.01.2023).

[703] See paragraph 28, in: NATO (1995): Study on NATO Enlargement, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_24733.htm (Last visit: 11.01.2023).

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The next phase (1997-2013) was therefore already set in motion in parallel to NATO's discussions about its first post-Cold War enlargement to include Eastern European countries. Back in the mid-1990s, when NATO had to contemplate the aspirations of the Eastern European countries for accession, there was considerable awareness in the transatlantic alliance on the sensitivities that this question represented for Russia. NATO's member states, especially the representatives from the U.S administration were pursuing a double course of cooperation with Russia while continuing the preparations for NATO enlargement. An essential cornerstone of this policy was the signing of the 1997 NATO-Russia Founding Act by both NATO and Russia. It was NATO's intention to integrate Moscow in alliance politics without allowing the Kremlin to veto NATO's decisions.[704]

Derived on the Founding Act, NATO's cooperative security mechanism with Russia has been considerably been deepened from the previous PfP cooperation framework by the creation of the NATO-Russia Permanent Joint Council as chief consultative body in a 'NATO member states + 1' format, which was refined since the 2002 Rome Declaration that established the NATO-Russia Council (NRC) with an additional preparatory committee as well as several further more specialised working bodies.[705] Thus, the NRC had become nothing more (but also nothing less) than a formalised NATO-Russia cooperative security framework committee, where both sides could discuss politico-military issues of concern for either side at eye-level.

Beyond the administrative structure of a dedicated committee for conducting NATO-Russia relations, the 1997 NATO-Russia Founding Act provided a few qualitative commitments for both sides. From a general deterrence point of view, the agreement of both parties regarding the following wording in the preamble represents a strong mutually given signal of political commitment by each side:

> "**NATO and Russia do not consider each other as adversaries**. […], NATO has radically **reduced and continues the adaptation of its conventional and nuclear forces**. […] Russia is **committed to further reducing its conventional and nuclear forces**." (1997 NATO-Russia Founding Act – Preamble)[706]

Nevertheless, deeds speak stronger than words, NATO committed itself to provide transparency on the conventional part of its deterrence and defence posture in the venue of the NRC:

[704] CFR (2017): Reducing Tensions Between Russia and NATO, pp. 9 f., Hyperlink: https://cdn.cfr.org/sites/default/files/pdf/2017/03/CSR_79_Marten_RussiaNATO.pdf (Last visit: 26.01.2023).
[705] NATO (n.a.): NATO-Russia Council – About NRC, Hyperlink: https://www.nato.int/nrc-website/en/about/index.html (Last visit: 27.10.2022).
[706] NATO (1997): Founding Act on Mutual Relations, Cooperation and Security between NATO and the Russian Federation, pp. 3 f. Hyperlink: https://www.nato.int/nrc-website/media/59451/1997_nato_russia_founding_act.pdf (Last visit: 23.10.2022).

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> "NATO and Russia have clarified their **intentions with regard to their conventional force postures** in Europe's new security environment and are prepared to **consult on the evolution of these postures in the framework of the Permanent Joint Council [i.e., the NATO-Russia Council since 2002]**." (1997 NATO-Russia Founding Act – IV. Political-Military Matters)[707]

Aside from the mutual commitments, whose sustainability might be debatable, NATO also made clear one-sided security commitments in both conventional and nuclear domains to Russia, which should not be underestimated.

Due to the geopolitical setting since 1992, the prime Soviet successor Russia had an obvious local conventional superiority in the Baltic region over its independent former territories. This did not matter so much in the initial post-Cold War era. In contrast, NATO has reached a conventional superiority over Russia in the general Euro-Atlantic region after the end of the Warsaw Pact and the dissolution of the Soviet Union.[708]

In this sense, NATO made two specific political commitments in the scope of the 1997 NATO-Russia Founding Act that were intended to accommodate Russia's particular military security interests regardless of any scope or geographic direction of post-Cold War era enlargements by NATO. The first commitment concerned the conventional deterrence and defence posture, which was reiterated to be the general basis of the mutually assured defence inside the transatlantic alliance, however, with a notable exemption:

> "NATO reiterates that in the current and foreseeable security environment, the Alliance will carry out its **collective defence** and other missions by **ensuring the necessary interoperability, integration, and capability for reinforcement rather than by additional permanent stationing of substantial combat forces**. […]. In this context, **reinforcement may take place**, when necessary, in the event of **defence against a threat of aggression** […]." (1997 NATO-Russia Founding Act – IV. Political-Military Matters)[709]

The politico-military commitment was a decisive step to reducing the general credibility of NATO's deterrence and defence posture[710] for its new post-Cold War era allied member states. While deployments in the 'original' Cold War allies were not covered and could thus be

[707] NATO (1997): Founding Act on Mutual Relations, Cooperation and Security between NATO and the Russian Federation, p. 14. Hyperlink: https://www.nato.int/nrc-website/media/59451/1997_nato_russia_founding_act.pdf (Last visit: 23.10.2022).
[708] Kühn, U./Peczeli, A. (2017): Russia, NATO, and the INF Treaty, p. 72.
[709] NATO (1997): Founding Act on Mutual Relations, Cooperation and Security between NATO and the Russian Federation, p. 14. Hyperlink: https://www.nato.int/nrc-website/media/59451/1997_nato_russia_founding_act.pdf (Last visit: 23.10.2022).
[710] It should be noted that such commitment did not reduce NATO's capabilities in the deterrence and defence posture *per se*, because the military equipment was still physically existing and the 1997 NATO-Russia Founding Act specifically allowed joint training in order to ensure interoperability between the different nations' forces.

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sustained, the new member states brought an eastward movement of NATO's exposed border with them. In that sense, those new Eastern member states' national armed forces were first and foremost to be expected to defend the territory before reinforcements would arrive (this is to be more thoroughly examined in subchapter 4.4.2 on NATO's credibility).

The second commitment by NATO was more or less directed at its nuclear-armed defender, the U.S., who had forward-deployed considerable amounts of nuclear weapons in allied member states in the Cold War. While these non-strategic *or* tactical nuclear weapons were drastically diminished (this is to be highlighted in subchapter 4.4.2.5 in regard to the U.S. nuclear weapons deployed in the scope of its nuclear sharing arrangement), Russia wanted to see the strategic balance for these types of nuclear weapons in the Euro-Atlantic region preserved.

> "The member States of NATO reiterate that they have **no intention, no plan and no reason to deploy nuclear weapons on the territory of new members**, **nor any need** to change **any aspect of NATO's nuclear posture or nuclear policy** - and do not foresee any future need to do so." (1997 NATO-Russia Founding Act – IV. Political-Military Matters)[711]

After the 1997 NATO-Russia Founding Act has been signed, three former Warsaw Pact members joined the transatlantic alliance in 1999 and seven more did so in 2004. Among the second NATO enlargement group were the three Baltic states that extended NATO's previously exposed border to Russia[712]. NATO did not allow Russia to veto any further enlargement, including the inclusion of the three Baltic states. Regardless of the politico-military perspective of the individual players, the difference between NATO and Russia since the beginning of NATO's first Eastern enlargement was marked by a variable degree of disagreement by Russia, but that third state either had not been able nor willing to interfere against NATO enlargement through military means in 1999 and 2004[713]

The last episode of NATO-Russia relations (2014-2016+) is briefly presented given that it was just the initial phase of a new era of continuous tensions that eventually evolved into the politico-military *détente* after Russia's full invasion of Ukraine in February 2022.

This episode began with the 2014 Russian annexation of Crimea and the Russian proxy war in the Donbass region against Ukraine. In response, the transatlantic alliance had strongly condemned Russia's aggressive and revanchist actions at the level of NATO's member state

[711] NATO (1997): Founding Act on Mutual Relations, Cooperation and Security between NATO and the Russian Federation, p. 12. Hyperlink: https://www.nato.int/nrc-website/media/59451/1997_nato_russia_founding_act.pdf (Last visit: 23.10.2022).

[712] For an overview and length of NATO's exposed borders see No. IV in the Appendices.

[713] Kramer, M. (2002): NATO, the Baltic States and Russia: A Framework for Sustainable Enlargement, pp. 747-749 and p. 756.

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heads of state and government at the 2014 Wales Summit and reiterated its commitment towards its member states of the alliance's collective defence posture without naming Russia explicitly. The nuclear part of the posture was also repeated, *albeit* with a general remark in view of the continued existence of nuclear weapons in the world.[714]

Two years later and at the end of the timeframe under examination, NATO's heads of state and government have reconvened yet again at another major joint meeting; the 2016 Warsaw Summit. Different from the 2014 Wales Summit, the summit did not produce a formal declaration, but a communiqué. This formal communication made general remarks aimed at potential adversaries (while not mentioning Russia explicitly) for the first time after the 2014 Russian annexation of Crimea. In the scope of the comments made on these generic adversaries, NATO underlined the strength of its conventional and nuclear deterrence and defence posture. It should be noted that in paragraph 44 of the 2016 Warsaw Summit Communiqué, NATO did not accept any hindrance to the movement of individual member states' military forces in all domains and throughout NATO territory as part of NATO's deterrence and defence posture.[715]

While NATO has not abandoned the 1997 NATO-Russia Founding Act in 2014 in response to the Russian illegal actions in Ukraine, the transatlantic alliance suspended all cooperation beside high-level talks. In addition, Russia continued on a track of 'verbal confrontation' with the transatlantic alliance, which prompted NATO to react with a communication campaign regarding its own viewpoint on key milestones of the transatlantic alliance as well as NATO-Russia relations in general. Among the most critical points for Russia had been the repeated claim that "NATO broke its promise not to expand further beyond its 1992 membership circle".[716]

Putting the NATO-Russia relations of the post-Cold War era in a nutshell, the initial post-Cold War era was marked by the first attempts of NATO to open up towards cooperative security frameworks in general and Russia in particular; hence, Russia became the first PfP country.

When the first NATO enlargement to Eastern Europe came up, the Cold War NATO member states were aware that such an enlargement might constitute a major issue with Russia and eventually agreed on a joint way forward with Russia through the 1997 NATO-Russia Founding

[714] See paragraphs 16-18 and paragraphs 49-52 in: NATO (2014): Wales Summit Declaration, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_112964.htm (Last visit: 27.01.2023).
[715] See paragraphs 32, 44 f., 47, and 52-54, NATO (2016): Warsaw Summit Communiqué, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_133169.htm (Last visit: 27.01.2023).
[716] See a collection of key accusations of Russia and NATO's responses in NATO (2022): NATO-Russia relations: the facts, Hyperlink: https://www.nato.int/cps/en/natohq/topics_111767.htm (Last visit: 04.10.2022); for a list of Russian key accusations and NATO responses, see: NATO (2022): Top Five Russian Myths Debunked, Hyperlink: https://www.nato.int/cps/en/natohq/115204.htm (Last visit: 04.10.2022).

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Act. Russia grudgingly agreed to that agreement in order to avoid being isolated politically. Nevertheless, the third state never wholeheartedly embraced the joint agreement with NATO.
While the 2008 Russo-Georgian War could have been considered a warning shot for the transatlantic alliance that Russia was willing to use military force to pursue military security, a substantive change in NATO's deterrence and defence posture in terms of its forward presence to Eastern Europe did only come two years after the 2014 Russian annexation of Crimea. After the Readiness Action Plan (RAP) was adopted at the 2016 Warsaw Summit, NATO's western member states began their first deployments of military troops in the scope of NATO's enhanced Forward Presence (eFP) to the Baltic states. Since NATO's eFP had not been a permanent movement but temporarily limited and rotationally deployed battalion-sized battlegroups (around 1.000 military personnel) to the Baltics and Poland, the military commitments by NATO's allies were not considered in compliance with NATO's conventional deterrence commitments towards the 1997 NATO-Russia Founding Act.[717]
Regardless of the legal or political issues surrounding Russia's and NATO's politico-military moves in the wake of the 2014 Russian annexation of Crimea, both sides were set on a confrontative track ever since, whose evolution culminated into a fully-fledged 'Cold War-like' adversarial relationship after Russia's 2022 full invasion of Ukraine, which is touched upon in the outlook in Chapter 5.

4.2.6 Interim conclusion on cooperative security frameworks

From an empirical perspective, cooperative security treaties have a proven decisive impact on the signature states' military capabilities. The 1990 CFE Treaty in subchapter 4.2.2 provided the mutually agreed massive reduction of overall conventional arsenals in the Euro-Atlantic region, thereby ensuring that a conventional strategic balance based on lower quantities of weapons remains intact. The (mostly) bilateral U.S.-Russia nuclear disarmament treaties of the 'START' series, as introduced in subchapter 4.2.3, have led to comprehensive and continuous decreases in the strategic nuclear arsenal of both countries, covering warheads as well as delivery systems. In subchapter 4.2.4, two key legacy treaties of the Cold War, namely the 1972 ABM Treaty and the 1987 INF Treaty, have been presented. Both are noteworthy for their effect on military capability development in the sphere of ballistic missile defence systems as well as intermediate- and medium-range ballistic missiles. While both the U.S. and Russia abided by

[717] This relates, *inter alia*, to NATO's enhanced Forward Presence (eFP), see: NATO-SHAPE (n.a.): About eFP - History, Hyperlink: https://shape.nato.int/efp/efp/history (Last visit: 22.10.2022).

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the 1987 INF Treaty throughout the period under examination[718], the U.S. decided to withdraw from the 1972 ABM Treaty in order to further develop and deploy their national BMD system after the first decade of the post-Cold War era.

Lastly, the 1997 NATO-Russia Founding Act was an important document that (1) established a formal cooperative working body between the alliance and Russia, and (2) gave Russia written security guarantees regarding the non-deployment of any nuclear weapons in the new (Eastern) NATO member states as well as several restrictions on NATO's force deployment in Eastern Europe.

If analysed in accordance with the three periods under examination in this dissertation, the initial post-Cold War era was marked by massive reductions in conventional and nuclear arms on the basis of the 1990 CFE Treaty and the 1991 START I Treaty.

After the first decade of the post-Cold War era, the first signs of stagnation in the domain of cooperative security appeared, since the 1993 START II Treaty was never ratified by Russia and the U.S. withdrew from the 1972 ABM Treaty. The only positive signs in that period have been the conclusion of the 1997 NATO-Founding Act that was intended to accommodate Russia's security concerns in regard to NATO's Eastern enlargement and the 2002 SORT Treaty that represented a minimal effort to replace START II.

After the second decade of the post-Cold War era, the 1990 CFE Treaty has eventually met its end by Russia's 2007 unilateral suspension, conventional arms reduction based on mutually agreed terms basically ceased. On a positive note, the U.S. relaunched its relations to Russia after the 2008 Russo-Georgian War and agreed upon the 2010 New START Treaty.

Putting the brief analysis throughout the period of examination in a nutshell, the initial post-Cold War era had a positive outlook and the massive reductions of conventional and nuclear arsenals in the 1990s was a clear success story for cooperative security.

From the 2000s onward, cooperative security frameworks began to stagnate while previously successful treaties were dumped by the U.S. and Russia without replacements. This period also extended into the time after the 2010s. As of 2023, the only treaty left from those selected few of this dissertation is the 2010 New START Treaty, whose fate might be sealed by February 2026 or earlier.[719]

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[718] The U.S. withdrew from the 1987 INF Treaty in August 2019. For more background details, see: NATO (2019): NATO and the INF Treaty, August 2019, Hyperlink: https://www.nato.int/cps/en/natohq/topics_166100.htm (Last visit: 07.09.2022).

[719] This might depend on the outcome of the 2022 Russian invasion of Ukraine and its impact on the strategic balance in the Euro-Atlantic region. Furthermore, see: Vaddi, P./Blanchette, N./Hinck, G. (2019): What Happens If the Last Nuclear Arms Control Treaty Expires?, Hyperlink: https://carnegieendowment.org/publications/interactive/new-start (Last visit: 27.12.2022).

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From a theoretic perspective, bi- and multilateral disarmament, arms control and cooperation treaties have been a natural field of war for bargaining theory which was introduced in subchapter 2.4.5. In contrast, the theoretic approach of PDT that was translated into the integrated conventional/nuclear deterrence game of subchapter 3.5 does not directly address cooperative security between the players. Nevertheless, within the remit of an integrated conventional/nuclear deterrence game, cooperative security arrangements can still be catered for in the following way.

From empirical observation, one can draw the assumption that cooperative security arrangements affect a key characteristic of each player, namely their individual military capabilities. Thus, cooperative security arrangements can be introduced into the game without changing the basic game structure in two ways.

Firstly, a cooperative security treaty might attribute a conventional or nuclear force allowance that the signature states need to comply with. On the basis of previously negotiated and subsequently consented quantitative limits, the state parties involved can principally preserve the *status quo* or strategic balance among all signature states at a lower total level of armaments. Thus, overall military capabilities decrease but the strategic balance can be ensured.

Secondly, besides the impact of such treaties on the quantity of conventional and nuclear military capabilities available to a player, a treaty can also influence the qualitative aspect in terms of restricting military capability development. For example, a challenger's threat posture based on large amounts of long-range ballistic missiles might motivate a defender or protégé to develop and deploy a ballistic missile defence system in order to pursue a damage reduction strategy for the case that deterrence based on own long-range ballistic missiles fails.

This variant of cooperative security treaty restricts the development of certain military capabilities for both sides, thus ensuring the strategic balance by preventing a one-sided destabilisation of the *status quo* or a mutual arms race.

By integrating cooperative security frameworks as exogenous factors that impact the quantity and quality of the military capabilities of one or more players, one can ensure a greater alignment with the empirical observations while not overloading the already complex integrated conventional/nuclear deterrence game in subchapter 3.5.

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4.3 Russia's threat posture in the post-Cold War era

Subchapter 4.3 is separated in four further subchapters.Subchapter 4.3.1 provides a very brief general introduction on the major political events in USSR in 1991 as well as a short introduction to state of affairs regarding Russia's armed forces in early 1992. Based on the two-pronged approach in accordance with subchapter 4.1.2, the two main parts of subchapter 4.2 are subchapter 4.3.2 and 4.3.3. Subchapter 4.3.2 entails the empirical analysis of Russia's threat posture in terms of credibility. This subchapter is separated in four parts with an introduction at the beginning followed by three subchapter that are reach dedicated to the period under examination as explained in subchapter 4.1.2.1. Subchapter 4.3.3 provides a comprehensive overview on the military capability landscape of Russia in line with the quantitative methodology from subchapter 4.1.2.2. Lastly, subchapter 4.3.4 gives a brief wrap-up with the results of the empirical analysis of Russia as the challenger in the integrated conventional/nuclear deterrence game.

4.3.1 An introduction to the early post-Cold War Russia

In order to properly understand Russia in the post-Cold War era, it is essential to recall the economic, political, and foreign policy context that the country started with when it became an independent country following the dissolution of the Soviet Union. There had been multiple crisis in the Soviet Union at once in the second half of the 1980s, which withered away the central domestic core of the country, namely the Soviet government based on the Communist Party of the Soviet Union (CPSU).

First of all, when the Soviet Union fell apart, it was already suffering from a severe economic crisis for some years.[720] In addition, the USSR's reputation as a technological superpower was greatly damaged by the 1986 nuclear catastrophe in Chernobyl. Lastly, even the most robust Soviet instrument of power – the Red Army –, which had been used to successfully supress reform in the socialist Eastern bloc in 1953 (German Democratic Republic), 1956 (Hungary), or 1968 (Czechoslovakia) had to retreat from Afghanistan in 1989 after a decade of fighting a protracted asymmetric war against the Western-backed Afghan mujahedeen fighters.[721]

[720] The details of the Socialist economic system with its shortfalls in comparison to liberal market democracies of the West are well-researched topics from general economics and are not addressed in the scope of this dissertation.

[721] Marples, D. (2011): Revisiting the Collapse of the USSR, pp. 461-463.

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Against this backdrop, the decisive figure of the Soviet ruling elites that played a key role in the USSR's eventual collapse became then-Secretary General of the central committee of the CPSU, Mikhail Gorbachev. With his programmes of *glasnost* and *perestroika*, i.e., the increasing transparency of the USSR policies in the media and the restructuring and modernisation programme for the Soviet economy, he tried to modestly reform the Union without destroying it. The introduction of Gorbachev's new policies in the USSR were met with varying degrees of enthusiasm in the Eastern European socialist satellite states that were partially more open to such reforms or opposing them.[722] Following Gorbachev's brief recovery back to power after a failed Soviet coup d'état in August 1991, the USSR's crisis has grown out of hand to such an extent that President Gorbachev was unable to prevent the USSR's dissolution in December 1991.[723]

From a politico-military perspective, two major issues were concerning the new Russian government under then-President Boris Yeltsin were the transformation of the remainders of the Soviet Red Army into the Russian armed forces and the location of Soviet nuclear weapons in other former Soviet countries that became independent after the demise of the USSR.

In regard to the first major concern, the Russian armed forces were founded in May 1992 as successor to the Soviet Red Army, of course. Back in the day, Russia owned a large part of former Soviet military equipment throughout all branches of the military (e.g., air force, army/ground forces, navy, and dedicated nuclear troops). There were numerous issues for the now-Russian Generals to deal with, such as the lack of availability of function equipment (Soviet materiel was of a varying degree of quality), lack of properly structured force formations (military personnel with other nationality than Russian were moved to their respective national forces), lack of adequate training as was as lack of social factors (prestige/discipline/morale, financial incentives to serve, the imbalanced social impact of the draft system due to avoidance rates, housing for those troops that moved back from Eastern Europe, and more). Herspring concluded that these challenges were so grave that the Russian armed forces had been better off at the beginning of the new era (1992) than three years later (1995).[724]

The second major concerns of the newly independent Russia had been the question of the Soviet nuclear arsenal which was spread across four successor states (Russia, Belarus, Ukraine,

[722] Mason, D. (1988): Glasnost, Perestroika and Eastern Europe, pp. 432-446.
[723] The introduction provides a very brief political background for the politico-military decision-making in regard to Russian deterrence policy. For more detailed information on the historic developments of the end of the Soviet Union, see: Kyriakodis, H. (1991): The 1991 Soviet and 1917 Bolshevik Coups Compared: Causes, Consequences and Legality, pp. 317-346.
[724] Herspring, D. (1995): The Russian Military: Three Years On, pp. 163-182.

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Kazakhstan). As shown in subchapter 4.2.3, this question was solved in favour of Russia's military security interests *de jure* by the accession of these three later countries to the 1991 START I Treaty on the basis of the 1993 Lisbon Protocol and *de facto* by returning the last Soviet nuclear weapon from Belarus to Russia in November 2016.[725]

4.3.2 The credibility of Russia's post-Cold War threat posture

This subchapter consists of four further subchapters. Subchapter 4.3.2.1 provides a general introduction to the analysis of the credibility of Russia's threat posture in line with the qualitative methodology as presented in subchapter 4.1.2.1. The subchapters 4.3.2.2 to 4.3.2.4 are dedicated to three iterations of the key politico-military document for Russia's threat credibility, namely its military doctrines, in line with subchapter 4.1.2.1. The overall results are collected and presented in conjunction with the results from subchapter 4.3.3 in the interim conclusion on Russia's threat posture throughout the examined periods in subchapter 4.3.4.

4.3.2.1 Introduction

Against the politico-military backdrop of Russia's new geopolitical and military situation that the country found itself into from 1992 onward, this subchapter applies the three-phase analytical approach for the post-Cold War era that was presented in subchapter 4.1.2.1.

The following documents are to be presented and interpreted through the 'lens of PDT' in terms of the credibility of Russia's threat posture, given that Russia has been determined as the challenger in the integrated conventional/nuclear deterrence game of this dissertation:

	Early post-Cold War era	*The post-Cold War era after the first decade*	*The post-Cold War era after the second decade*
Politico-military documents	[1992 draft Military Doctrine]; 1993 Military Doctrine	2000 Military Doctrine	2010 Military Doctrine

Table 34: Overview of relevant key politico-miliary documents of Russia for the challenger's role [own presentation]

Concerning the politico-military documents, four important caveats should be first and foremost be mentioned before continuing upon the course of their further analysis. The first caveat is the reliability of the documents under examination. It is assumed that the content of these documents can and should be taken as 'honest' messages towards the world outside

[725] Sakwa, R./Webber, M. (1999): The Commonwealth of Independent States, 1991-1998: Stagnation and Survival, pp. 379-386; and: ACA (2020): The Lisbon Protocol at a Glance, Hyperlink: https://www.armscontrol.org/node/3289 (Last visit: 18.12.2022).

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government in the sense that they are not fabricated lies or intentional pieces of propaganda issued to misdirect outside observers. While setting this as a caveat in the case of Russia (while not in the case of NATO or the U.S.) might appear as a potential bias, but after careful consideration of Russia in the political context of the post-Cold War era, there were several indications in the 1990s that Russia had already begun the development of propaganda instruments comparable to 'hybrid warfare'.[726]

While the use of intentionally false information within the remit of hybrid warfare as an instrument for misleading (foreign) – the point of reference for this type of warfare would be the 2013 Gerasimov Doctrine[727] – it is still important to remain aware of the possibility that interpretations of the world in official Russian documents could either be a 'true' reflection of Russia's threat perception *or* a 'false front' that Russia uses as a justification for implementing policies that might not necessarily be connected in any way with the topic.[728] RAND blogger Olga Oliker described the challenge of correctly understanding Russia's public messaging quite well in the sense that Russia's military doctrine (in this case as its 2014 edition)

> "[…] is meant not only to describe Russian policy but also to send messages to friends, adversaries, and others. The challenge lies in understanding Russia's signals, as well as their repercussions." (Oliker)[729]

After 'setting the record straight' recording the seriousness of the interpretation of formal Russian documents, the second caveat is a formal one. Official documents from the Russian Federation are usually produced in the Russian language. In order to integrate the politico-military documents into this analysis, full text English translations made available by think tanks (e.g., the Federation of American Scientists, the Carnegie Endowment for International Peace, and the Arms Control Association) were drawn upon.[730]

The third caveat concerns the 1992 draft Military Doctrine of Russia, which was never formally approved by then-President Yeltsin who wanted a less confrontative document. While it never went active, it was nevertheless briefly included in the analysis as an important milestone in the

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[726] Giles, K. (2015): Russia's Hybrid Warfare: A Success in Propaganda, pp. 1-5.
[727] Klein, M. (2016): Russia's Military: On the Rise?, pp. 7-9.
[728] NATO (2022): NATO-Russia relations: the facts, Hyperlink: https://www.nato.int/cps/en/natohq/topics_111767.htm (Last visit: 04.10.2022); and: NATO (2022): Top Five Russian Myths Debunked, Hyperlink: https://www.nato.int/cps/en/natohq/115204.htm (Last visit: 04.10.2022).
[729] RAND Blog (2015): Russia's New Military Doctrine: Same as the Old Doctrine, Mostly. By Olga Oliker, Hyperlink: https://www.rand.org/blog/2015/01/russias-new-military-doctrine-same-as-the-old-doctrine.html (Last visit: 17.01.2023).
[730] Between the years 1993-2022 and in accordance with the document collection of the Belfer Center for Science and International Affairs, there were around 20 documents from the Russian government that were identified as strategic. For the examined timeframe of this dissertation, most documents were just available in English, see: Russia Matters (2022): Russian Strategic Documents, Hyperlink: https://www.russiamatters.org/russian-strategic-documents (Last visit: 28.01.2023).

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politico-military considerations of Russia in the initial post-Cold War era. Since the 1992 draft Military Doctrine has not been available as a full text in English[731], FitzGerald's in-depth analysis of this draft doctrine[732] was taken as the authoritative secondary source[733] for the initial analysis in subchapter 4.3.2.2.

As a fourth and last caveat, it should be mentioned that states differ in terms of their transparency towards the non-governmental outside world. Some states publish more official documents with actual content then others. In this sense, the selection of the officials documents under scrutiny might only provide a certain 'snapshot' of the official foreign, security and defence policies (especially in view of dynamically evolving situations at the domestic or international level, e.g., through the participation in active military conflicts). The selectively chosen documents in Table 34 serve as the foundation of the threat posture from a credibility point of view towards NATO, but cannot account for Russia's posture beyond its own territory with a view to likewise Western and NATO military operations abroad (e.g., military actions of both sides in the Middle East, such as Russia's military support to Syria or the Global Coalition against Daesh).

In the following subchapters 4.3.2.2, 4.3.2.3, and 4.3.2.4, the different Military Doctrines of Russia are analysed on the basis of the operationalisation following posture determination in hard or soft as provided in Table 35 below.

For Russia as a challenger of the integrated conventional/nuclear deterrence game, the category of the posture is derived from the decisions made by the relevant national authorities, the Kremlin in particular, which followed rational deliberations in order to maximise the state's military security. In accordance with the official Russian politico-military line of thinking, military security represents

> "[…] a state of **protection** of the **vitally important interests** of the individual, society, and the state **against external** and internal **military threats** associated with the utilization or threat of military force that is **characterized by the absence of a military threat** or by the **ability to counter such a threat**;" (2010 Military Doctrine of the Russian Federation)[734]

[731] Slagle, J. (1994): New Russian Military Doctrine: Sign of the Times, p. 88 and the final note no. 14 on p. 98, Hyperlink: https://apps.dtic.mil/sti/pdfs/ADA528125.pdf (Last visit: 28.01.2023).
[732] This secondary source's analysis contains analyses of the 1992 draft Military Doctrine itself as well as the politico-military context at the time, see: FitzGerald, M. (1993): Russia's New Military Doctrine, pp. 24-44.
[733] Slagle, J. (1994): New Russian Military Doctrine: Sign of the Times, p. 94 and the final note no. 3 on p. 98, Hyperlink: https://apps.dtic.mil/sti/pdfs/ADA528125.pdf (Last visit: 28.01.2023).
[734] See General provisions, paragraph 6 a), in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).

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For a quick reference of the conditions that determine the category of Russia's empirically identified posture, see the duplicate of Table 35 below (this is a duplicate of Table 20):

No.	*Indicators for a hard posture*	*Indicators for a soft posture*
1	Define the defender/protégé as a military threat to the challenger	Definition the defender/protégé as a military danger at most to the challenger
2	Retain/increase the warfighting posture against a defender/protégé	Decrease the warfighting posture against a defender/protégé
3	Retain/increase the role of nuclear weapons in the military doctrine	Decrease the role of nuclear weapons in the military doctrine
4	Strengthen military capability development in order to close the capability gap with the defender/protégé	No mention of military capability development for closing the capability gap with the defender/protégé

Table 35: Challenger's criteria for each posture in an integrated conventional/nuclear deterrence game

As briefly mentioned in conjunction with Table 35, Russia uses a distinctive professional language in its military doctrines to describe the relationship between itself and a source of a threat. Moscow distinguishes two different categories of threats, namely 'military dangers' and 'military threats'.

The officially translated definition of the term 'military danger' is

> "[…] a state of interstate or intrastate relations characterized by **an aggregation of factors capable in certain conditions** of leading to the **emergence of a military threat**;" (2010 Military Doctrine of the Russian Federation)[735]

In comparison the more commonly used term 'military threat' means

> "[…] a state of interstate or intrastate relations characterized by the **real possibility of the outbreak of a military conflict** between opposing sides and by a **high degree of readiness** on the part of a given state (group of states) or separatist (terrorist) organizations to **utilize military force** (armed violence);" (2010 Military Doctrine of the Russian Federation)[736]

The wordings of the two terms suggest that Russia determines the impact of threats in accordance with this hierarchical two-phase approach. The definition for military dangers appears broad and general enough by principally calling 'anything or nothing' as a military security risk for Russia, while the definition of military threats based on perceived "real possibility" and "high degree of readiness" leave enough room for the Russian authorities to respond politically, militarily or not at all. In this sense, it has been decided by the author to

[735] See General provisions, paragraph 6 b), in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).

[736] See General provisions, paragraph 6 c), in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).

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attribute the description of 'military danger' as part of a soft posture, while defining something as a 'military threat' as a hard posture.

For the case that military threats lead to a series of events that eventually erupt into a military conflict, Russia distinguished three cases of (inter-state) conflict with an increasing scale of intensity. While the failure of deterrence is not an integral part of this dissertation's analysis – a failure of deterrence leading to a full-scale war between NATO and Russia in the timeframe 1992-2016 did not happen, fortunately –, the Russian perspective on the differences between the scope of individual conflicts provide important insight on Russia's politico-military thinking regarding its readiness for using its conventional and nuclear forces.

In its military doctrines, Russia defined three different types of wars that are herewith shortly introduced. While the English version of the 1993 Military Doctrine did not contain any definition[737] and the 2000 Military Doctrine only employed some brief description per form of war[738], the 2010 Military Doctrine has been the most rigorous in its definition of these three types of war. In accordance with the 2010 Military Doctrine,

(1) a local war is

> "[…] a war between two or more states pursuing **limited military-political objectives** in which **military actions** are conducted **within the borders of the warring states** and which affects **primarily the interests (territorial, economic, political, and other) of only these states**;" (2010 Military Doctrine of the Russian Federation)[739]

(2) a regional war is

> "[…] a war involving two or more states in the same region waged by national or **coalition armed forces** and involving the **utilization of both conventional and nuclear means of attack** on the **territory** of the region and in **adjoining waters** and the **airspace (outer space)** above it in the course of which the sides would be **pursuing important military-political objectives**;" (2010 Military Doctrine of the Russian Federation)[740]

(3) a large-scale war is

> "[…] a war between **coalitions of states** or **major world community states** in which the sides would be **pursuing radical military-political**. A large-scale war may result

[737] FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).

[738] See chapter II. Military-Strategic Principles, subchapter Nature of Wars and Armed Conflicts, paragraphs 7-9, in: ACA (2000): The Russian Federation Military Doctrine, Hyperlink: https://www.armscontrol.org/act/2000-05/russias-military-doctrine (Last visit: 29.01.2023).

[739] See General provisions, paragraph 6 f), in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).

[740] See General provisions, paragraph 6 g), in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).

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> from the **escalation of an armed conflict or a local or regional war** to involve a significant number of states from various regions of the world. It would require the **mobilization of all the participating states' available material resources and spiritual forces**;" (2010 Military Doctrine of the Russian Federation)[741]

From the different forms of war in accordance with the Russia's thinking, regional wars are already events wherein the use of nuclear weapons are expected, while the definition of a local war does not specify the means used in those kinds of conflicts. Obviously, these definitions should not be considered as academic and too exact in nature; they are after all part of a biased politico-military document of one of the players of the integrated conventional/nuclear deterrence game. In the analysis of Russia's military doctrines, it is therefore assumed that local wars are at least be fought with conventional means, *albeit* nuclear-armed states might want to escalate with nuclear weapons. In regard to any higher-intensity conflict above local wars, the use of nuclear weapons is determined as part of the regular warfare strategy instead of a mere option by the nuclear-armed states.

4.3.2.3 Russia's initial post-Cold War military doctrine

The first attempt of Russia to formulate a military doctrine for its newly formed military forces has been the 1992 draft Military Doctrine, which was published in the Russian military journal *Military Thought* in Russian language. It does not come as a surprise, given the transition of the country from the core of a union to an independent state that Russia's military thinking was still relying on the Soviet military thinking with its own set of doctrines, *albeit* with some new turns in view of the geopolitical situation at the time.[742]

The 1992 draft Military Doctrine moved away from Gorbachev's intentions to reduce the role of the military in domestic affairs, brought in observations made from the U.S. operations in in the second Gulf War of 1990/1991, and the disintegration of the Soviet Union with the poor perspectives of the Commonwealth of Independent States (CIS) that was struggling to keep the Soviet successor states (at least those that were willing the join) politically and economically aligned.[743] In this sense, the draft Military Doctrine had a geographical and a military-technical component. In regard to the geographical component, the doctrine was strategically ambiguous:

[741] See General provisions, paragraph 6 g), in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).
[742] FitzGerald, M. (1993): Russia's New Military Doctrine, pp. 24 f.
[743] Slagle, J. (1994): New Russian Military Doctrine: Sign of the Times, pp. 88-93, Hyperlink: https://apps.dtic.mil/sti/pdfs/ADA528125.pdf (Last visit: 28.01.2023).

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> "The new doctrine describes **two potential** developments that would constitute "direct" **military threats to Russia**: **introduction of foreign troops into contiguous states**, and **buildup of air, naval, and ground forces near Russian borders**." (FitzGerald)[744]

In this sense, post-Cold War Russia was continuous in its military thinking that any deployment of further military forces in the adjacent states and territorial waters would be considered an act of aggression, while the Russian response was not spelled out at that point.

Regarding the scope of the military-technical component of the 1992 draft Military Doctrine, the document saw certain changes in the wording that diverged from the previously known Soviet doctrine as it became more assertive in tone (e.g., from "repel aggression" to "repel aggression and defeat the opponent") and more ambiguous concerning the results from a comprehensive nuclear war (e.g., from "will be catastrophic for mankind" to "might be catastrophic for mankind"), including the considerations that nuclear escalation might not necessarily lead to a global war. The draft doctrine also adapted the previous conventional military policies from a defensive to a more offense/defence posture, including the intention for further reinforcement planning:

> "Russia's 1992 doctrine defines "**military-strategic parity**" as approximate ***quantitative*** **equality in all types of weapons** - a clear rejection of the civilian call for a *qualitative* assessment of parity." (FitzGerald)[745]

In the nuclear domain, the Russian draft Military Doctrine made a decisive shift in determining the role of its nuclear weapon arsenal in potential large-scale conflicts:

> "[…] Russia now views **conventional strikes on its nuclear and other "dangerous" targets** as an **escalation to weapons of mass destruction** - which implies that **such strikes will elicit a nuclear response**. […] conflict. In addition, Russian military spokesmen **nuclear weapons** have become a **strategic deterrence factor vis- à-vis the massive armies of neighbors** such as China." (FitzGerald)[746]

Lastly, the draft doctrine also gave a priority to newly advanced military technology, which was mainly undergirded by the Russian observations of the second Gulf War. The successful use of precision-guided munitions by the U.S. in that conflict underlined the key role of the air force in air-to-ground attacks, proved the deployment of a theatre ballistic missile defence (TMD) systems to defend regional allies successfully against Iraqi SCUD missiles.[747]

[744] FitzGerald, M. (1993): Russia's New Military Doctrine, p. 35.
[745] FitzGerald, M. (1993): Russia's New Military Doctrine, p. 37.
[746] FitzGerald, M. (1993): Russia's New Military Doctrine, p. 35 and p. 36.
[747] FitzGerald, M. (1993): Russia's New Military Doctrine, pp. 35-43.

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Thus, based on the operationalised criteria that determine the specific posture for the challenger in the integrated conventional/nuclear deterrence game at a discrete time, **the limited overall assessment of 1992 draft Military Doctrine indicates a hard politico-military posture for Russia in the initial post-Cold War era**.

In view of the official policy of the Kremlin, the draft Military Doctrine was never adopted by then-President Yeltsin. Instead, shortly after the draft, the 1993 Military Doctrine was written. In the first parts of the 1993 Military Doctrine the *rationale* of Russia's military security was defined from a very high-level perspective, which provides valuable insight into the threat perception of the Russian authorities at the time:

> "Ensuring the **Russian Federation's military security** and its vitally important interests **depends** first and foremost: […]
> - in the foreign policy sphere on the **state of relations** with the surrounding world, **primarily with our immediate neighbors and the leading powers**. […]
>
> Proceeding from this premise, the Russian Federation: […]
> - **regards no state as its enemy**;
> - will not **employ its Armed Forces** or other troops against any state other than for **individual or collective self-defense** if an armed attack is made on the Russian Federation, its citizens, territory, Armed Forces, other troops, or its allies." (1993 Military Doctrine of the Russian Federation)[748]

In this sense, the key take-aways for Russia's threat posture in the initial post-Cold War era would be that (1) there is no defined general adversarial relationship with another state, (2) the Russian armed forces were (re-)built with (collective) self-defence in mind, and (3) the key states on which the Russian foreign policy is focussed are its direct neighbours as well as those that Russia determined as "leading powers" (most assuredly, the U.S. would belong to that group).

In conjunction with the dichotomy of 'military danger' and 'military threat' that Russia defined for itself, which was explained in subchapter 4.3.2.1, the 1993 Military Doctrine described NATO, in all but name, as a military danger for its military security:

> "The basic existing and potential sources of **external military danger** for the Russian Federation are: […]
> - **existing and potential local wars** and armed conflicts, particularly those in the **immediate vicinity** of the Russian borders;
> - the **possibility of the use** (including the unsanctioned use) **of nuclear and other types of weapons of mass destruction** which a number of states have in service; […]
> - the possibility of **strategic stability** being undermined as a result of the violation of international accords in the sphere of **arms limitation and reduction** and of

[748] See subchapter 2.1, in: FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).

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the **qualitative and quantitative buildup of armaments by other countries**; […]
- the **expansion of military blocs and alliances** to **the detriment of the interests** of the **Russian Federation's military security**;" (1993 Military Doctrine of the Russian Federation)[749]

Considering that a 'military danger' can become a 'military threat' if several factors aggregate in certain conditions, the messages sent by Moscow in regard the actions taken by a military alliance have been quite clear:

> "The document then goes on to identify factors which help **transform a military danger into an immediate military threat** to the Russian Federation:
> - the **buildup of groupings of troops** (forces) **on the borders of the Russian Federation** to the point where they **disrupt the prevailing correlation of forces**; […]
> - the **introduction of foreign troops in the territory of neighboring** states of the **Russian Federation** […]." (1993 Military Doctrine of the Russian Federation)[750]

These two sentences should be considered as the essential parts of the 1993 Military Doctrine for Russia's conventional posture. While the mere enlargement of a military alliance is not sufficient to qualify as a military threat, the following actions performed by that military alliance would constitute a threat: (1) If military alliance builds up sufficient forces in an alliance member state that is adjacent to Russian external borders in order to tip the conventional balance of forces on both sides of the border in favour of the alliance, *or* (2) if alliance forces are stationed in those member states adjacent to Russia's external border.

In terms of the fine distinction between those two points, it is assumed that the build-up of forces by an alliance could be performed by any potential military action, which might not necessarily be connected with a state of crisis between Russia and the military alliance. Such a temporary build-up could occur when allied military forces train together in the neighbouring state, where there might be a discrete time window of an imbalance between Russia's peacetime posture on its own exposed territory nearby and the alliance's forces in training.

Furthermore, the second point did not consider any quantity issues in its wording in comparison to the first point. In this sense, any (!) assumedly permanent or continuous deployment of allied forces in the member state(s) neighbouring Russia would be seen as a military threat, even though these forces might not (!) tip the balance in favour of the military alliance.

[749] See subchapter 2.1, in: FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).
[750] See subchapter 2.1, in: FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).

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In a nutshell, Russia drew a rather clear 'red line' in its 1993 Military Doctrine which state of affairs might constitute a military danger and a clear threat, namely the kind and extend of allied military force deployments in Russia's adjacent states.

From a Russian perspective, the deterrence of such action should be derived from combat-ready Armed Forces in accordance with the following foundations:

> "[…] the **maintenance of the combat potential** of **peacetime general-purpose** groupings of troops (**forces**) at a level ensuring that aggression on a **local (regional) scale is repulsed**;
> […] the **ensuring**, within the framework of the state measures to **switch** the country from a **peacetime to a wartime footing**, of the **strategic deployment of the Armed Forces** and other troops;" (1993 Military Doctrine of the Russian Federation)[751]

In line with the wording of the tasks for the Russian Federation's Armed Forces, it must have sufficient peacetime forces available to fight a local as well was a regional war. This represents no minor undertaking as already regional wars would be fought with nuclear weapons if the definition of the 2010 Military Doctrine was already a general baseline assumption in 1993.

In addition, if the country would really engage in a larger war, especially when NATO member states were concerned, Russia would most likely activate its wartime posture with even further forces and resources involved.

Furthermore, Russia made already a clear commitment to keep its nuclear forces ready and capable, however, without any specific belligerent language regarding nuclear weapons' usage against a specific country:

> "[…] the **maintenance of the composition** and status of the **strategic nuclear forces** at a level **ensuring guaranteed intended damage to the aggressor** in any conditions of the situation;" (1993 Military Doctrine of the Russian Federation)[752]

Given the underlining of Russia's policy to retain a robust nuclear arsenal, Russia decided to formulate an 'inverted' stance regarding the use of nuclear weapons in the new era by describing the cases where it would not draw upon its own nuclear arsenal. In this sense, Russia

> "[…] will **not employ its nuclear weapons** against any **state-party to the Treaty on the Nonproliferation of Nuclear Weapons**, dated I July 1968, **which does not possess nuclear weapons except in the cases of**: a) an armed attack against the Russian Federation, its territory, Armed Forces, other troops, or its allies **by any state which is connected by an alliance agreement with a state that does possess nuclear weapons**; b) **joint actions by such a state with a state possessing nuclear weapons** in the carrying out or in support of any invasion or armed attack upon the Russian Federation,

[751] See subchapter 3.2, in FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).
[752] See subchapter 2.1, in: FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).

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> its territory, Armed Forces, other troops, or its allies;" (1993 Military Doctrine of the Russian Federation)[753]

Given that NATO continued to consider itself a nuclear alliance in the post-Cold War era[754], Russia certainly did not subsume the transatlantic alliance under those cases where it would set aside the use of nuclear weapons. Thus, the doctrine is herewith further examined in regard to those cases wherein Russia considered a chance for nuclear weapons to be used.

Nevertheless, Russia made it clear that it had no interest in actively promoting a nuclear threat against those states or group of states that fall outside the 'inverted' declaration of non-use of nuclear weapons. In contrast, Russia

> "[…] seeks the **reduction of nuclear forces** to a **minimal level** which would **guarantee the prevention of large-scale war** and the **maintenance of strategic stability** and -- in the future -- the complete elimination of nuclear weapons." (1993 Military Doctrine of the Russian Federation)[755]"

Thus, in the nuclear domain, Russia stressed a position that reflects the preservation of *the status quo* of the Cold War which was based on mutually assured destruction in order to ensure that neither the U.S. nor the Soviet Union/Russia decided to conduct a change of the *status quo*.

In regard to its tone, the Russian nuclear policy became, nevertheless, more assertive than the nuclear policy of the USSR since the 1970s that restricted the doctrinal use of nuclear weapons in response to a nuclear attack. However, the likelihood of a use of nuclear weapons by Russia did not increase *per se* as the national nuclear arsenal was intended to deter the initiation of war against Russia's territory and national survival.[756]

Given the fact that the end of the Warsaw Pact and bloc confrontation led to a decreasing chance of a large-scale military conflict between states, Russia was looking at the new geopolitical realities with a similar perspective than the other states of the Euro-Atlantic region:

> "In conditions where the threat of world war (both nuclear and conventional) is considerably reduced, even if not entirely eliminated, the **main danger to stability** and peace is posed by **local wars and armed conflicts**. The likelihood of their arising in certain regions is growing. […] **Armed conflicts and local wars** can in certain

[753] See subchapter 2.1, in: FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).
[754] The question of nuclear weapons in NATO is addressed in more detail in subchapter 4.4. At this point, it is suffice to say that the transatlantic alliance continued to mention this characteristic of their alliance, *inter alia*, in: NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', pp. 14 f., Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 03.12.2022).
[755] See subchapter 2.1, in: FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).
[756] See the first and second paragraphs, in: NTI (n.a.): Russia's 2000 Military Doctrine. By Nikolai Sokov, Hyperlink: https://www.nti.org/analysis/articles/russias-2000-military-doctrine/ (Last visit: 29.01.2023).

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conditions **escalate into a large-scale war**." (1993 Military Doctrine of the Russian Federation)[757]

Preparing for such local wars and armed conflict was not considered a 'light exercise' for Russia armed forces. At the one hand, given that Russia still employed a nuclear arsenal, the Russian leadership considered any attempt of an opponent to interfere with the credibility and capability of the Russian nuclear deterrent a threat which might lead to an unwanted escalation to a nuclear war (without answering if Russia would be willing to initiate that escalation):

> "**Deliberate actions by the aggressor** which **aim to destroy or disrupt the operation of the strategic nuclear forces**, the early-warning system, nuclear power and atomic and chemical industry installations may be factors which **increase the danger** of a war using conventional weapons systems **escalating into a nuclear war**.
> The **document contains the thesis** that any, including limited, **use of nuclear weapons in a war by even one side may provoke the massive use of nuclear weapons** and have catastrophic consequences." (1993 Military Doctrine of the Russian Federation)[758]

In addition to such an occurrence in a specific conflict, about which any nuclear-armed state might have contemplated since their respective ownership of nuclear weapons, there were further more conventional considerations that needed tackling by Russia, especially in view to the observations made by Russia's politico-military elites about the technologically advanced U.S. operations against Iraq:

> "Military operations in armed conflicts and local wars may be characterized by: […]
> - the **use of the entire available arsenal of means of armed violence** -- from **light small arms** to **state-of-the-art arms and military hardware**, including **high-precision weapons systems** of the combatant sides." (1993 Military Doctrine of the Russian Federation)[759]

In order to ensure the competitiveness of Russia's armed forces, the Kremlin defined so-called "military-technical priorities" whereof the following one contemplates about the military technology required for a participation in such local wars:

> "[…] the **development and production of highly efficient systems** for the **command and control of troops and weapons**, communications, intelligence, strategic warning, electronic warfare, and **precision, mobile, nonnuclear weapons**, as well as systems for their information support;" (1993 Military Doctrine of the Russian Federation)[760]

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[757] See subchapter 3.1, in: FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).
[758] See subchapter 3.1, in: FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).
[759] See subchapter 3.1, in: FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).
[760] See subchapter 4.1, in: FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).

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As a consequence of these priorities, the 1993 Military Doctrine defined several milestones for the Russian armed forces for a three-year timeframe and a further five-year timeframe thereafter. The Kremlin's plans represent a considerable effort in regard to shaping and reforming Russia's military in accordance with the politico-military context of switching from the Soviet Red Army composition and operation to the Russian national military structures and standing:

"Through 1996:

- the **creation of** groups of troops (**forces**) on the territory of the Russian Federation in accordance with their mission and tasks;
- the **improvement of the troops' branch structure**;
- the **completion of the withdrawal back to Russian territory** of formations and units stationed outside Russia;
- the continuation of the **switch to the mixed system of manpower acquisition**, which combines voluntary service -- under contract -- with service based on drafting citizens for military service on the exterritorial principle;
- the **reduction in the numerical strength of the Armed Forces** to the established level.

In the period 1996-2000:

- the **completion of the reorganization of the Armed Forces structure**, the switch to the mixed system of manpower acquisition, and the creation of groupings of troops (forces) and a military infrastructure on the territory of the Russian Federation." (1993 Military Doctrine of the Russian Federation)[761]

In view of Russia's military retreat demise of the Warsaw Pact and the reorganisation of its military after the dissolution of the Soviet Union, any adaptations pertaining to the politico-military instruments cannot be measured in anything less than several years.[762] In this sense, it has been logical that Russia's military forces were quite busy implementing the Kremlin's military reforms.

Following the application of the four operational indicators in Table 35 of subchapter 4.3.2.1 on Russia's 1993 Military Doctrine, Russia employed a 'soft threat posture' in the initial-Cold War era.

The individual results from the evaluation of the four indicators were the following:

(1) *Definition the defender/protégé as a military danger at most to the challenger (soft)*: Russia categories the expansion of military blocs and alliances as a 'military danger' while not naming any specific cases. In addition, Russia had also declared that it considered no state as enemy.

(2) *Decrease the warfighting posture against a defender/protégé (soft)*:

[761] See subchapter 3.3, in: FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).
[762] Herspring, D. (1995): The Russian Military: Three Years On, pp. 163-182.

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In the aftermath of the Cold War, Russia considered large-scale war as considerably reduced and prioritised military efforts in order to ensure that Russia's military is able to prevail in local wars and armed conflicts below large-scale wars.

(3) *Decrease the role of nuclear weapons in the military doctrine (soft)*:

While Russia retained its comprehensive nuclear triad, it expressed an 'inverted' clause to not use nuclear weapons against any 1968 NPT-compliant member state that is (1) not a nuclear power itself, or (2) that is allied with a nuclear power. Given that NATO is a nuclear alliance, the 'inverted' clause does not cover NATO' member states. Nevertheless, Russia announced its interest in further nuclear disarmament under the condition that (1) it wants to keep a minimal nuclear deterrent for ensuring MAD and (2) it wants to see that the strategic stability (*or* strategic balance) between the nuclear powers is maintained.

(4) *No mention of military capability development for closing the capability gap with the defender/protégé (soft)*:

While Russia announced its plans regarding a comprehensive military reform and the development of more advanced weapon systems, it also acknowledged that the Russian military was quite occupied by the return of forces from the former Warsaw Pact states back to Russia and that the Kremlin wanted to reduce the number of military personnel. Furthermore, there is no direct hint that the capability development is linked to any state, *albeit* one should not forget that Russia took lessons learned from the 1990/1991 U.S. high-tech military intervention in Iraq.

4.3.2.3 Russia's military doctrine after the first decade of the post-Cold War era

The 2000 Military Doctrine of the Russian Federation was amongst the first politico-military strategic documents signed by Vladimir Putin[763], the designated successor to then-President Yeltsin, who was formally elected as President in March 2000.

Putin arrived in office in a geopolitical situation in a time that differed considerably from the time of his predecessor's first year in office. Subsequently, a revision of the national military doctrine made a lot of sense: In 1999, NATO has eventually completed its first Eastern enlargement by accepting Poland, Hungary, and the Czech Republic to the transatlantic alliance.[764] Due to Poland's accession, NATO's external border to Russia, which was

[763] See the first paragraph, in: NTI (n.a.): Russia's 2000 Military Doctrine. By Nikolai Sokov, Hyperlink: https://www.nti.org/analysis/articles/russias-2000-military-doctrine/ (Last visit: 29.01.2023).

[764] NATO16 + Czech Republic, Hungary, Poland. (1999 and earlier). See: NATO (2022): Member countries, July 2022, Hyperlink: https://www.nato.int/cps/su/natohq/topics_52044.htm?selectedLocale=en (Last visit: 26.08.2022).

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previously limited to the traditional Norway-Russia border, was basically doubled through the addition of the exposed Polish border to the Russian Kaliningrad *oblast* – the strategically important exclave of the Russian Federation located between Lithuania and Poland.[765]

Furthermore, under the impressions of the NATO intervention in Kosovo, the politico-military decision-making circles in the Russian Security Council seemed to react by contemplating Russia's nuclear policies (use of nuclear weapons), conducting further focussed military exercises (defending Russia against a limited conventional Western (air) attack).[766]

While the 1993 Military Doctrine differentiated between military dangers and military threats, the English translation of the 2000 Military Doctrine did not do so. It identified the following external threats:

> "The **main external threats** are: […]
> - the creation (**buildup**) of groups of troops (**forces**) leading to the **violation of the existing balance of forces**, **close to the Russian Federation's state border** and the **borders of its allies** or on the **seas adjoining their territories**;
> - the **expansion of military blocs and alliances** to the **detriment of the Russian Federation's military security**;
> - the **introduction of foreign troops** in violation of the UN Charter **on the territory of friendly states adjoining the Russian Federation**; […]
> - **actions aimed at undermining global and regional stability**, **not least by hampering the work of Russian systems of state and military rule**, **or at disrupting the functioning of strategic nuclear forces**, missile-attack early warning, antimissile defense, and space monitoring systems and systems […];" (2000 Military Doctrine of the Russian Federation)[767]

This blurred the two categories of military danger and military threat in the 2000 Military Doctrine. If the 1993 Military Doctrine is used as a baseline for comparison to the 2000 Military Doctrine, it remained that the expansion of a military alliance could be interpreted as an obvious 'military danger' for Russia. In regard to the 'military threats', the build-up of foreign forces in order to tip the balance between a military alliance's and Russia's military in favour of the alliance has also been a clear continuity of Russia's concerns.

Two further elements have been presented as military threats in accordance with the 2000 Military Doctrine that could not be attributed precisely to one of the two categories. While the 1993 doctrine mentioned the introduction of foreign troops in neighbouring states as a military

[765] The Conversation (2022): Kaliningrad: Russia's 'unsinkable aircraft carrier' deep in Nato territory, Hyperlink: https://theconversation.com/kaliningrad-russias-unsinkable-aircraft-carrier-deep-in-nato-territory-182541 (Last visit: 08.10.2022).

[766] See the fourth paragraph, in: NTI (n.a.): Russia's 2000 Military Doctrine. By Nikolai Sokov, Hyperlink: https://www.nti.org/analysis/articles/russias-2000-military-doctrine/ (Last visit: 29.01.2023).

[767] See chapter I. Military-Political Principles, subchapter The Main Threats to Military Security, paragraph 5, in: ACA (2000): The Russian Federation Military Doctrine, Hyperlink: https://www.armscontrol.org/act/2000-05/russias-military-doctrine (Last visit: 29.01.2023).

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threat, the wording in the 2000 doctrine included the condition: "in violation of the UN Charter on the territory of friendly states adjoining the Russian Federation". By applying a minimum of 'premonition' to the 2010 Military Doctrine[768], the deployment of forces of other nations in neighbouring states in violation of the UN Charter would basically be considered as a 'military danger' to Russia.

The other element was pertaining to any state's "actions aimed at undermining global and regional stability" that included, but were not limited to, the strategic nuclear forces. Given Russia's sensitivity as shown in the 1993 Military Doctrine on questions of nuclear deterrence and strategic stability, it is assumed that any activities that interfere with the Russian nuclear arsenal were perceived as a clear 'military threat'.

Considering the warfighting capabilities, the 1993 Military Doctrine required Russia's Armed Forces to repel aggression on a local/regional scale in peacetime and retain the ability to grow in capacity and capability in wartime[769], the 2000 Military Doctrine considerably expanded the Russian Armed Forces' missions and operations with a view to fighting a regional or large-scale war.

> "The main missions of the Russian Federation Armed Forces and other troops are: […]
> b) in **rebuffing an armed attack (aggression)** on the Russian Federation and (or) its allies:
> - **partial or full strategic deployment**;
> - **conduct of strategic operations, operations, and combat operations** (including jointly with allied states) to **rout the invaders and eliminate** groups of troops (forces) that have been (are being) created by the aggressor in regions where they are based or concentrated and on communication routes; **maintenance of readiness** for utilization, **and utilization** […] of the **nuclear deterrent potential**;" (2000 Military Doctrine of the Russian Federation)[770]

The final aim of Russia's military forces in such regional or large-scale war corresponded to the following tasks:

> "The **Russian Federation Armed Forces** and other troops should be prepared to **repulse aggression, effectively engage an aggressor, and conduct active operations** (both defense and offensive) under any scenario for the unleashing and waging of wars and armed conflicts, under **conditions of the massive use by the enemy of modern**

[768] See chapter II. The Military Dangers and Military Threats to the Russian Federation, paragraph 8 h), in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).
[769] See subchapter 3.2, in FAS (1993): The Basic Provisions of the Military Doctrine of the Russian Federation, Hyperlink: https://nuke.fas.org/guide/russia/doctrine/russia-mil-doc.html (Last visit: 12.12.2022).
[770] See chapter II. Military-Strategic Principles, subchapter Principles Governing the Use of the Russian Federation Armed Forces and Other Troops, paragraph 17 b), in: ACA (2000): The Russian Federation Military Doctrine, Hyperlink: https://www.armscontrol.org/act/2000-05/russias-military-doctrine (Last visit: 29.01.2023).

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> **and advanced combat weapons, including weapons of mass destruction of all types.**" (2000 Military Doctrine of the Russian Federation)[771]

Considering Russia's definition of the different types of wars, it comes to no surprise that Russia's nuclear deterrent is mentioned throughout the paragraphs dedicated to the performance of higher-intensity warfare. Nevertheless, the 2000 Military Doctrine also offered dedicated paragraphs on Russia's criteria for the use of nuclear weapons. In continuity with the 1993 Military Doctrine, Russia kept the 'inverted' condition that excludes nuclear weapons usage against the treaty-compliant signature states of the 1968 Nuclear Non-Proliferation Treaty (NPT)[772]. However, Russia also introduced new language related to the use of nuclear weapons that exceeded the nuclear policies that were spelled out in the previous editions of Russia's military doctrines.[773]

> "The Russian Federation **reserves the right to use nuclear weapons** in **response to the use of nuclear** and **other types of weapons of mass destruction** against it and (or) its allies, as well as **in response to large-scale aggression utilizing conventional weapons in situations critical to the national security** of the Russian Federation." (2000 Military Doctrine of the Russian Federation)[774]

In this sense, a conventional attack against Russia which would fundamentally undermine the country's national (military) security could trigger a nuclear response. However, no further details were given what this "large-scale aggression" based on conventional weapons actually means, thereby enabling sufficient 'strategic ambiguity' for Russia in its courses of action.
Regarding the military capability development, Russia continued on its course to spell out the requirement for general modernisation without any remark to a specific adversary or capability gap to a military alliance.

> "[…] **all-around support** for and **qualitative improvement** of the **Russian Federation Armed Forces** and other troops, military formations, and organs and **maintenance of their readiness** for coordinated actions to avert, localize, and neutralize external and internal threats;

[771] See chapter II. Military-Strategic Principles, subchapter Principles Governing the Use of the Russian Federation Armed Forces and Other Troops, paragraph 16, in: ACA (2000): The Russian Federation Military Doctrine, Hyperlink: https://www.armscontrol.org/act/2000-05/russias-military-doctrine (Last visit: 29.01.2023).
[772] See chapter I. Military-Political Principles, subchapter Safeguarding Military Security, paragraph 8, in: ACA (2000): The Russian Federation Military Doctrine, Hyperlink: https://www.armscontrol.org/act/2000-05/russias-military-doctrine (Last visit: 29.01.2023).
[773] NTI (n.a.): Russia's 2000 Military Doctrine. By Nikolai Sokov, Hyperlink: https://www.nti.org/analysis/articles/russias-2000-military-doctrine/ (Last visit: 29.01.2023).
[774] See chapter I. Military-Political Principles, subchapter Safeguarding Military Security, paragraph 8, in: ACA (2000): The Russian Federation Military Doctrine, Hyperlink: https://www.armscontrol.org/act/2000-05/russias-military-doctrine (Last visit: 29.01.2023).

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> […] **preparation of a system of measures** to transfer the **Russian Federation Armed Forces** and other troops to **a war time footing** (including their **mobilization deployment**);" (2000 Military Doctrine of the Russian Federation)[775]

At the military-technological level, Russia kept dedicated to the development of modern equipment, including the developing of precision guided ammunitions:

> "[…] to create the economic and financial conditions for the **development and production of highly efficient standardized command and control of troops** and control of weapon assets, communications, intelligence-gathering, strategic-early warning, and electronic warfare systems, and **precision mobile non-nuclear weapons** and the information support systems for them;" (2000 Military Doctrine of the Russian Federation)[776]

At the same time, Russia remained compliant to the various disarmament and arms control treaties, which the country (and its predecessor, the USSR) had signed throughout the past decade(s). In this sense, it remained committed to

> "[…] **punctiliously implements** the Russian Federation's **international treaties** as regards **strategic offensive arms and antimissile defense**, and is ready for further reductions in its nuclear weapons, on a bilateral basis with the United States as well as on a multilateral basis with other nuclear states, **to minimal levels meeting the requirements of strategic stability**;" (2000 Military Doctrine of the Russian Federation)[777]

Interestingly, there has not been any mention of the 1990 CFE Treaty, whose 1999 adaption was strongly welcomed by Russia because it accommodated two decisive Russian concerns. The first one was the revision of restrictive conventional military force allowances for Russia deployments at its northern and southern 'flank regions'. The second one was the reorganisation of the Eastern-Western group ceilings that practically disadvantaged non-NATO states into individual country ceilings in order to rebalance the Treaty-Limited Equipment (TLE) thresholds.[778]

Following the application of the four operational indicators in Table 35 of subchapter 4.3.2.1 on Russia's 2000 Military Doctrine, Russia employed an ambivalent threat posture

[775] See chapter I. Military-Political Principles, subchapter Safeguarding Military Security, paragraph 10 a), in: ACA (2000): The Russian Federation Military Doctrine, Hyperlink: https://www.armscontrol.org/act/2000-05/russias-military-doctrine (Last visit: 29.01.2023).
[776] See chapter III. Military-Economic Principles, subchapter Safeguarding Military-Economic Provision for Military Security, paragraph 3, in: ACA (2000): The Russian Federation Military Doctrine, Hyperlink: https://www.armscontrol.org/act/2000-05/russias-military-doctrine (Last visit: 29.01.2023).
[777] See chapter I. Military-Political Principles, subchapter Safeguarding Military Security, paragraph 7, in: ACA (2000): The Russian Federation Military Doctrine, Hyperlink: https://www.armscontrol.org/act/2000-05/russias-military-doctrine (Last visit: 29.01.2023).
[778] Hayashi, M. (2013): Suspension of Certain Obligations of the CFE Treaty by NATO Allies: Examination of the Response to the 2007 Unilateral Treaty Suspension by Russia, pp. 132-134.

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after the first decade of the post-Cold War era that cannot be directly attributed in a 'hard or soft' posture.

The individual results from the evaluation of the four indicators leading to that inconclusive result were the following:

(1) *Definition the defender/protégé as a military danger at most to the challenger (soft)*:

If the English version of the 2000 Military Doctrine is taken as a basis for determining Russia's position on the enlargement of military blocs and alliances, the wording changed from 'military danger' to 'threat'. However, given that the indiscriminate use of the term 'threat' does not necessarily coincide with a doctrinal shift and furthermore, considering that the 2000 Military Doctrine did not call out any alliance in particular (despite that the first NATO Eastern enlargement was completed by 1999), it is assumed that Russia in Putin's first year of reign was not about to declare NATO a military threat *per se*.

(2) *Retain/increase the warfighting posture against a defender/protégé (hard)*:

Considering Russia's perceptions regarding the wars that the Russian military had to prepare for, which entailed, *inter alia*, massive use of advanced weapon systems as well as different forms of weapons of mass destruction, the warfighting posture in accordance with the 2000 Military Doctrine moved directly towards the planning of a large-scale war with a peer- or near peer adversary. While still no adversary was named, few countries and alliances at the time of the doctrine's writing were able to deploy the described conventional and nuclear weapons.

(3) *Retain/increase the role of nuclear weapons in the military doctrine (hard)*:

Russia stressed its willingness and commitment to abide by the existing international treaties regarding strategic offensive arms and ballistic missile defence which underlines a status quo approach in relation to the strategic balance between the nuclear powers. Nevertheless, 2000 Military Doctrine made a decisive change in the wording regarding the use of nuclear weapons by Russia. On the basis of this doctrine, Russia considers the use of nuclear weapons as legitimate in case that a large-scale conventional aggression against Russia occurs, which threatens the Russia's critical national security interests.

(4) *No mention of military capability development for closing the capability gap with the defender/protégé (soft)*:

Despite the continuous announcement of strengthening the military capabilities of the Russian armed forces by developing and deploying advanced high-precision munitions, better command and control systems, or improved surveillance and reconnaissance systems,

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there was no direct link that these efforts were connected to a concrete conflict scenario with an adversary.

4.3.2.4 Russia's military doctrine after the second decade of the post-Cold War era

For the Russia's politico-military elites, it became quite clear that the 2000 Military Doctrine might be nothing more than an 'interim solution' (Schmidt/Müller) due to the various external and domestic events that shaped Russia's foreign, defence and security policy on its road to the end of the second decade of the post-Cold War era. Given that a full account of this time would be beyond the scope of this dissertation, herewith three examples from the external domain should just be named:

(1) The impact of the 9/11 terrorist attacks of 2001 on the U.S. and subsequently on large parts of Europe and the Middle East heavily affected Russia which has fought against its own domestic terrorist groups, *inter alia*, in Chechnya since the 1990s.

(2) As a consequence of the UN non-sanctioned 2003 invasion of Iraq by the U.S. with the ouster of authoritarian Iraqi leader Saddam Hussein, several regimes such as North Korea and Iran continued their efforts in ballistic missile technology and nuclear weapons development in order to avoid the Iraqi president's fate.

(3) Since the U.S. has made it clear from the 1990s onward that such 'rogue states', as the just named North Korea and Iran, represent a threat to the U.S. (and its allies and partners), the U.S. administration under George W. Bush withdrew from the 1972 ABM Treaty (the treaty was highlighted in subchapter 4.2.4).[779]

And if that was not enough for Russia to reconsider its military doctrine, then the efforts performed by NATO in its further Eastern enlargements definitely was. Since the 1990s, Russia's decision-making elites in the Kremlin had underlined that the enlargement of NATO into Eastern Europe would constitute a violation of Russia's national security interests. After 1999, the accession of the three former Warsaw Pact members Poland, Hungary, and the Czech Republic were barely acceptable to an economically weakened Russia that agreed grudgingly to swallow the first Eastern enlargement in exchange for the 1997 NATO-Russia Founding Act (addressed in subchapter 4.2.5). With the 2004 NATO Eastern enlargement, the transatlantic alliances accepted seven additional new member states, of which all were part of the former Eastern bloc. The accession of the three Baltic states might have played a decisive role for

[779] Schmidt, H.-J./Müller, H. (2010): Zwischen nationaler Selbstbehauptung und Kooperationssignalen: zur Einschätzung der neuen russischen Militärdoktrin, pp. 3-5, Hyperlink: https://nbn-resolving.org/urn:nbn:de:0168-ssoar-292406 (Last visit: 04.02.2023).

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Russia in that particular enlargement round, because the Russian exclave of Kaliningrad *oblast* was now completely surrounded by NATO territory, thereby only accessible by sea in case of a NATO-Russia conflict, moreover the direct Russia-NATO border was further extended by another approximately 650 km[780]. In addition, if Russia's close politico-military ally Belarus is included in the calculation, the combined exposed border between NATO (Estonia, Latvia, Lithuanian) and Russia plus Belarus would amount to the same length as the former Cold War 'frontline' between Western Germany and the Warsaw Pact members German Democratic Republic and Czechoslovakia.[781]

While the NATO enlargements in 1999 and 2004 have already alienated Russia from the transatlantic alliance, the 2008 NATO summit in Bucharest was the decisive moment for the future of NATO-Russia relations, when NATO's member states contemplated the prospect of Georgia's and Ukraine's accession requests to the transatlantic alliance. While the W. Bush administration favoured their accession, France and Germany were strongly opposed due to the fear that Russia might feel threatened by the alliance. The ensuing compromise that was principally accepting eventual accession at another time in the future was barely accommodating Russia's national security interests. In this context, the Kremlin made valuable lessons learned through the successful execution of the 2008 Russo-Georgian War from both a credibility as well as the military capability point of view. Recalling this conflict briefly, Georgia provoked a Russian military intervention as a reaction to a violent intra-Georgian crisis between South Ossetian and Abkhazian Pro-Russian separatists and the Georgian government.[782] Since the military capability perspective is tackled in the upcoming subchapter 4.3.3, the impact on Russia's credibility should furthermore be addressed. The Western response to the conflict in the Caucasus was not very remarkable, as several informed observers noticed at the time. While Russia made it perfectly clear to the U.S., Europe, and any other former Soviet country (such as Ukraine) that Russia's national security interests had to be adequately accommodated in order to prevent an escalation from tensions over crises to outright conflict, NATO's response to Russia's military action were quite muted. As a result, Russia deemed itself successful in having (re-)established its claim for a 'sphere of influence' that the

[780] See the lengths of the exposed border of NATO's Eastern European member states to Russia in No. IV in the Appendices.

[781] Shlapak, D./Johnson, M. (2016): Reinforcing Deterrence on NATO's Eastern Flank: Wargaming the Defense of the Baltics, pp. 3 f., Hyperlink: https://www.rand.org/content/dam/rand/pubs/research_reports/RR1200/RR1253/RAND_RR1253.pdf (Last visit: 08.09.2022).

[782] Mearsheimer, J. (2014): Why the Ukraine Crisis Is the West's Fault: The Liberal Delusions That Provoked Putin, pp. 77-80.

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Kremlin derived from the self-perception of being a great power that competes with the U.S. (and to lesser extend with a few European countries) at level-playing field.[783]

Lastly, and for the record, it should be mentioned that around the same time of the 2003 Iraq War and the 2004 NATO Eastern enlargement, the population of Georgia and Ukraine were the first ones that launched the so-called 'colour revolutions', who desired a transformation in their political system. These revolutions were interpreted by Russia's power elites as a direct threat to their own national regime of 'controlled democracy'. Furthermore, high ranking Russian individuals, such as Foreign Minister Lavrov, understood these revolutions as a foreign policy instrument used by the U.S. and Europe to destabilise their geopolitical neighbourhood.[784]

From a Russian domestic perspective, one aspect should at least be mentioned. In 2008, there was a formal change in the government when the presidency moved from Vladimir Putin to Dmitry Medvedev, one of Putin's aides from his Saint Petersburg days. The reason for the formal political change was due to the provisions of Russia's constitution that only allowed the President to hold the office for two consecutive terms. When Medvedev's term came to an end in 2012, it was not a major surprise for informed observers that Vladimir Putin, who occupied the position of Prime Minister between 2008-2012, moved back to his formal position at the Kremlin's President again. After all, one might perceive the Medvedev presidency as just an interim-solution for Putin to formally claim back the central position that he retained in the background through the Medvedev *interregnum*.[785] Against this backdrop, the sustainability of Medvedev's foreign policy, *inter alia*, through the signature of the bilateral New START treaty (which was addressed in subchapter 4.2.3) as well as the efforts in response to the newly elected U.S. President Obama's "Reset" policy vis-à-vis Russia in 2010 remain in doubt.[786]

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[783] One might argue that the muted Western reaction to the Russian partaking in the 2008 Russo-Georgian War confirmed Russia in making the move to the next level of military action, such as the 2014 Russian annexation of Crimea and the prolonged proxy war in Donbass. See also: Atlantic Council (2021): The 2008 Russo-Georgian War: Putin's green light, Hyperlink: https://www.atlanticcouncil.org/blogs/ukrainealert/the-2008-russo-georgian-war-putins-green-light/ (Last visit: 04.02.2023).

[784] A comprehensive report of a panel discussion with speakers from the highest Russian foreign and military authorities, e.g. Foreign Minister Lavrov and Russian Chief of Staff Gerasimov, in: CSIS (2014): Russia and the "Color Revolution": A Russian Military View of a World Destabilized by the US and the West, Hyperlink: https://csis-website-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/publication/140529_Russia_Color_Revolution_Full.pdf (Last visit: 04.02.2023).

[785] New York Times (2011): Putin Once More Moves to Assume Top Job in Russia, Hyperlink: https://www.nytimes.com/2011/09/25/world/europe/medvedev-says-putin-will-seek-russian-presidency-in-2012.html (Last visit: 04.02.2023).

[786] Fast forward another decade, whatever was left of the expectations towards an apparently liberal-thinking Medvedev in Western images has been utterly destroyed by his comments in mass media in the wake of the 2022 Russian invasion of Ukraine through his shrill rhetoric that included threats of Russia using nuclear weapons against Ukraine, see: Reuters (2023): Russia's Medvedev says more U.S. weapons supplies mean 'all of Ukraine will burn', Hyperlink: https://www.reuters.com/world/europe/russias-medvedev-says-more-us-weapons-supplies-mean-all-ukraine-will-burn-2023-02-04/ (Last visit: 04.02.2023).

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Against this politico-military backdrop, Russia's 2010 Military Doctrine is hereby examined following the approach that was already pursued in subchapters 4.3.2.2 and 4.3.2.3.

By beginning with Russia's perception in regard to potential sources of military threats that the country might, the 2010 Military Doctrine follows the same dichotomous methodology regarding the distinction of a military 'risk' from a general perspective into specific military danger and an actual military threat for Russia as the two previous military doctrines. The conceptual description of the differences between those distinctions were given in subchapter 4.3.2.1.

However, the 2010 Military Doctrine was considerably diverging from both previous military doctrines because it mentioned a key entity as a specific military danger, namely NATO. In the following part of this subchapter, the military dangers with a view to NATO's deterrence and defence posture are discussed in more detail.

> "The **main external military dangers** are:
>
> a) the desire to endow the **force potential of the North Atlantic Treaty Organization (NATO) with global functions** carried out in violation of the norms of international law and to **move the military infrastructure of NATO member countries closer to the borders of the Russian Federation**, including by **expanding the bloc**;
>
> b) the attempts to **destabilize the situation in individual states** and regions and to **undermine strategic stability**;
>
> c) the **deployment** (buildup) of troop contingents of foreign states (groups of states) **on the territories of states contiguous with the Russian Federation** and its allies and also **in adjacent waters**;
>
> d) the **creation and deployment of strategic missile defence systems undermining global stability** and **violating the established correlation of forces in the nuclear-missile sphere**, and also the militarization of outer space and the **deployment of strategic nonnuclear precision weapon systems**; […]
>
> g) the **violation of international accords by individual states**, and also noncompliance with previously concluded international treaties **in the field of arms limitation and reduction**;" (2010 Military Doctrine of the Russian Federation)[787]

Different from the first two military doctrines of 1993 and 2000, the 2010 Military Doctrine that were merely applying more generalised wording ("the expansion of military blocs and alliances to the detriment of the Russian Federation's military security" (1993/2000 Military Doctrines)), the 2010 edition explicitly referred to the transatlantic alliance. Instead of simply changing the general terms, such as military blocs and alliances, with NATO, the text in paragraph 8 a) expanded its references to the specific context case of NATO on the basis of the experiences made since the 1990s. In this sense, Russia perceived NATO's military force

[787] See chapter II. The Military Dangers and Military Threats to the Russian Federation, paragraph 8, in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).

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posture as encroaching to a global scale, which might have been triggered by NATO's operations in Yugoslavia, Kosovo, Afghanistan, and Libya. Furthermore, the enlargement of the transatlantic alliance was perceived as an end in itself but as part of a wider 'NATO strategy' that intended to establish military infrastructure closer to Russia's borders to the detriment of Russia's security interests ("NATO encirclement of Russia").[788]

While the domestic implications of the external factor of the 'colour revolutions' in Russia's geographic neighbourhood had only briefly been touched upon, the statement in paragraph 8 b) clearly reflected Russia's perception of such social movements as destabilising occurrences in its sphere of influence and as in infringement on the strategic stability between Russia and the Western power bloc.

In comparison to the two first parts of paragraph 8, the deployment of military forces in territories and waters adjacent to Russia, as mentioned in paragraph 8 c), represents a continuous concern for Russia. This in itself is quite rational given that massive troop deployments in regions adjacent to exposed borders would also be seen by NATO as a threatening move by the opposing power.

The last two parts highlighted from paragraph 8 are d) and g). In regard to g), which is a more or less direct accusation against the U.S., which withdrew from the 1972 ABM Treaty, and the West in general that did not ratify Russia's much desired 1999 Adaptation of the CFE Treaty, the background of these issues was already highlighted in subchapter 4.2.2 and 4.2.4.

Part d) of paragraph 8 refers to the introduction of the national BMD system that the W. Bush administration pursued after the U.S. withdrawal from the 1972 ABM Treaty in 2002. The implications of BMD from a strategic balance perspective continued to persist despite President Obama's 2009 'European Phased Adaptive Approach' (EPAA) – a U.S. commitment to NATO for deploying and operating a multi-layered sea- and land-based BMD in Europe – that altered the original plans of the W. Bush administration by restricting the first deployment of SM-3 interceptor missiles with no ICBM interception capabilities in Europe (a limited capability to intercept ICBMs should only be added through a more advanced SM-3 variant in phase 3 around the year 2022.[789] In view of further military dangers identified in paragraph 8 d), such as the 'the deployment of strategic nonnuclear precision weapon systems' that the U.S. actively

[788] NATO performed a strategic communication effort in regard to the unmasking of Russia's arguments in the context of the 2022 Russian invasion of Ukraine, see: NATO (2022): Top Five Russian Myths Debunked, Hyperlink: https://www.nato.int/cps/en/natohq/115204.htm (Last visit: 04.10.2022).

[789] ACA (2022): The European Phased Adaptive Approach at a Glance, Hyperlink: https://www.armscontrol.org/factsheets/Phasedadaptiveapproach (Last visit: 04.02.2023); and: Pifer, S. (2015): US-Russia Relations in the Obama Era: From Reset to Refreeze?, p. 113. In: *IFSH (ed.), OSCE Yearbook 2014, 2015*.

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pursued since the 2002 Nuclear Posture Review (presented in subchapter 4.5.2.2.), there were strong indications that Russia was predominantly concerned with the gap in its military capabilities to the ones of the U.S., which retained an advantage due to greater investments in military research and development as well as the procurement of larger quantities of high-tech military equipment.

Completing the situational picture of Russia's distinction between military dangers and military threats, the military threats mentioned in paragraph 10 below are much more abstract and difficult to pinpoint to an exact incident.

> "The **main military threats** are:
> a) a **drastic deterioration in the military-political situation** (interstate relations) and the creation of the **conditions for the utilization of military force**;
> b) the **impeding of the operation of systems** of state and military command and control of the Russian Federation, the **disruption of the functioning of its strategic nuclear forces**, missile early warning systems, […];
> d) a **show of military force with provocative objectives** in the course of **exercises on the territories** of states **contiguous with the Russian Federation** or its allies;
> e) a **stepping up of the activity** of the Armed Forces **of individual states (groups of states) involving partial or complete mobilization** and the **transitioning** of these states' organs of state and military command and control **to wartime operating conditions**." (2010 Military Doctrine of the Russian Federation)[790]

This should be considered a fully rational approach, because it enables the Kremlin to determine without any doctrinal constraints when a military danger has evolved to an actual threat. When paragraphs 8 and 10 are interpreted in conjunction with paragraph 12, Russia's threat perception can be uncovered.

> "**Characteristic features of contemporary military conflicts** are:
> a) the **integrated utilization of military force** and forces and **resources of a nonmilitary character**;
> b) the **massive utilization of weapons** and **military equipment systems based on new physical principles** that are **comparable to nuclear weapons in terms of effectiveness**;
> c) the broadening of the scale of the **utilization of troops (forces)** and resources **operating in airspace and outer space**;
> d) the **intensification** of the role of **information warfare**;
> e) the **reduction of the time parameters for preparing to conduct military operations**;
> f) an **increase in the promptness of command and control** as a result of transitioning from a strict vertical system of command and control to a **global networked automated command and control system for troops** (forces) and weaponry;

[790] See chapter II. The Military Dangers and Military Threats to the Russian Federation, paragraph 10, in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).

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g) the creation on the warring sides' territories of a **permanent zone of military operations**." (2010 Military Doctrine of the Russian Federation)[791]

It must be taken into account that 2010 Military Doctrine was written at a time where NATO's member states were very active in various crisis management operations in the Middle East and Afghanistan as well as in the Mediterranean Sea and at the Horn of Africa. Western perspectives regarding the form of the future armed conflict were shaped by low-intensity highly asymmetric non-state threats that they had engaged at the time.

In contrast, Russia perceived the contemporary armed conflict to be one wherein states make use of "massive utilization of weapons and military equipment systems based on new physical principles that are comparable to nuclear weapons in terms of effectiveness". Thus, Russia rather prepared for a classical large-scale inter-state war with a highly advanced peer- or superior adversary than one or more minor-scale crisis management operations against non-state actors.

Russia's expectation for a large-scale armed conflict was also duly reflected in warfighting tasks of the Russian military as introduced in the 2010 Military Doctrine on the basis of a peacetime, a direct threat of conflict, and a wartime 'mode'.

"The **main tasks of the Armed Forces** and other troops **in peacetime** are: […]
b) to **ensure strategic deterrence**, including the prevention of military conflicts;
c) to **maintain the composition** and state of combat and mobilizational readiness and training of the **strategic nuclear forces**, forces and resources that support their functioning and use, and command and control systems **at a level guaranteeing the infliction of the required damage on the aggressor whatever the conditions of the situation**;
d) to **provide timely warning to the supreme commander in chief of the Russian Federation Armed Forces of an air or space attack** and **notification** to the organs of state and military administration and the troops (forces) **about military dangers and military threats**;
e) **maintain the capability of the Armed Forces** and other troops for the timely **deployment of groupings of troops (forces)** in potentially **dangerous strategic salients**, and also to maintain their readiness for combat use; […]" (2010 Military Doctrine of the Russian Federation)[792]

Taking into account that peacetime could be interpreted as the state of affairs in NATO-Russia relations throughout the post-Cold War era, the defined requirements in paragraph 27 should receive particular attention. If there is one surprise to this part of the 2010 Military Doctrine, it

[791] See chapter II. The Military Dangers and Military Threats to the Russian Federation, paragraph 12, in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).
[792] See chapter III. The Military Policy of the Russian Federation, paragraph 27, in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).

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is the very strong representation of Russia's nuclear deterrent in the Kremlin's peacetime-related prioritisation. Parts b), c), and d) of paragraph 27 mainly relate to the respective nuclear forces, while Russia's conventional military capabilities for deployments were addressed in a rather marginal way. When moving from peacetime to a direct threat of conflict mode, the conventional forces were mentioned more pronouncedly, but as part of a broader politico-military approach in order to deter any opponent from aggressive actions against Russia. At the same time, the nuclear forces got yet again a further underlining of their role.

> "The **main tasks of the Armed Forces** and other troops **during a period of direct threat of aggression** are:
> a) to implement a **package of additional measures aimed at lowering the level of the threat of aggression** and increasing the level of combat and mobilizational readiness of the Armed Forces and other troops with **a view to carrying out mobilizational and strategic deployment**;
> b) to **maintain the nuclear deterrence potential** at the established degree of readiness;
> […]" (2010 Military Doctrine of the Russian Federation)[793]

When moving from the direct threat of conflict to the wartime mode, the 2010 Military Doctrine remained very brief but rational.

> "The **main tasks** of the Armed Forces and other troops **in wartime** are to **rebuff aggression** against the Russian Federation and its allies, to **inflict defeat on the aggressor's troops (forces)**, and to **force him to cease hostilities on terms that meet the interests of the Russian Federation** and its allies." (2010 Military Doctrine of the Russian Federation)[794]

In a nutshell, when a war broke out, Russia could principally be using all available forces and resources to stop the military opponent, defeating his troops and forcing him to a peace accord in line with Russia's terms.

In view of the analytical approach derived from the Perfect Deterrence Theory (PDT) and taking into account that the challenger is nuclear-armed Russia, the statements regarding the use of nuclear weapons are particularly relevant for the outcome of the integrated conventional/nuclear deterrence game with NATO and the U.S. as nuclear-armed defender as opposing players.

> "In the context of the implementation by the Russia Federation of **strategic deterrence measures of a forceful nature**, provision is made for the **utilization of precision weapons**.

[793] See chapter III. The Military Policy of the Russian Federation, paragraph 28, in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).
[794] See chapter III. The Military Policy of the Russian Federation, paragraph 29, in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).

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> The **Russian Federation reserves the right to utilize nuclear weapons in response to the utilization of nuclear and other types of weapons of mass destruction against it** and (or) its allies, and **also in the event of aggression against the Russian Federation involving the use of conventional weapons when the very existence of the state is under threat**. The **decision to utilize nuclear weapons is made by the Russian Federation president**." (2010 Military Doctrine of the Russian Federation)[795]

While the 2010 Military Doctrine explicitly underlined the potential crisis scenario, wherein the use of conventional weapons would be met with nuclear force by Russia ("when the very existence of the state is under threat" (2010 Military Doctrine)), the statement was weaker than the one from the 2000 Military Doctrine ("in situations critical to the national security of the Russian Federation" (2000 Military Doctrine)). Nevertheless, the Western perception of what is meant by the nuclear statement of the 2010 Military Doctrine encompassed any conventional large-scale attack on Russia's critical infrastructure and comprehensive destruction of key force components in Russia from a military perspective as well as the political prospect of Russia failing to stop a conventional invasion into its main territory. The reason behind the heightening of Russia's threshold for the use of nuclear weapons might be derived from the implementation of its conventional capability modernisation programmes in the aftermath of the 2008 Russo-Georgian War.[796]

In this context, it is quite surprising that the reference in regard to Russia's armed forces military capability development in the 2010 Military Doctrine remained rather generic.

> "The **tasks of equipping the Armed Forces** and other troops with armaments and military and specialized equipment are:
> a) to **comprehensively equip (reequip) with up-to-date models of armaments and military** and specialized equipment the **strategic nuclear forces**, permanent readiness **large formations** and troop units of the **general-purpose forces** […], and to **maintain them in a condition that will support their combat use**;
> b) to **create multifunctional (multirole) systems of armaments and military** and specialized equipment using standardized components; […]
> e) to **ensure the functional and organizational-technical unity** of the arms systems of the Armed Forces and other troops;
> f) to **create new models of high-precision weapons** and develop information support for them;" (2010 Military Doctrine of the Russian Federation)[797]

[795] See chapter III. The Military Policy of the Russian Federation, paragraph 29, in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).
[796] Ven Bruusgaard, K. (2021): Russian nuclear strategy and conventional inferiority, pp. 17-22.
[797] See chapter IV. Military-Economic Support for Defence, paragraph 41, in: Carnegie Endowment for International Peace (2010): The Military Doctrine of the Russian Federation, Hyperlink: https://carnegieendowment.org/files/2010russia_military_doctrine.pdf (Last visit: 29.01.2023).

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Taking into account that Russia decided to not ratify the 1993 START II in reaction the 2002 U.S. withdrawal from the 1972 ABM Treaty and to suspend the CFE Treaty in 2007 in response to the Western refusal of ratifying the 1999 Adapted CFE Treaty, Russia's conventional and nuclear military capability development was largely unrestraint, *albeit* with the notable exemption of the 2010 New START Treaty (see subchapters 4.2.1 and 4.2.2 for further reference).[798]

While it seemed that the text highlighted a lightly stronger prioritisation of its nuclear forces in paragraph 41 a), the empirical evidence (which is further examined in subchapter 4.3.3 on Russia's military capabilities) does not fully support that interpretation as the conventional capabilities gained new or updated equipment.

Following the application of the four operational indicators in Table 35 of subchapter 4.3.2.1 on Russia's 2010 Military Doctrine, Russia's employed a 'hard threat posture' after the second decade of the post-Cold War era.

The individual results from the evaluation of the four indicators were the following:

(1) *Define the defender/protégé as a military threat to the challenger (hard)*:

While Russia still described NATO as a 'military danger' rather than a 'military threat', practically all mentioned 'military dangers' in the 2010 Military Doctrine can be relayed to NATO and its member states in multiple ways. In accordance with Russia's threat perception, it is, *inter alia*, concerned about (1) NATO's global role, (2) NATO's infrastructure in countries bordering Russia, (3) NATO's forces that deploy in land or sea territories of Russia (regardless if they are alliance territory or international waters), or (4) the build-up of ballistic missile defence systems that the U.S. already did in a national capacity and which was soon to follow within the remit of NATO's capability development.

(2) *Retain/increase the warfighting posture against a defender/protégé (hard)*:

The main tasks for the Russian military as described for peacetime (!) conditions encompassed the full range of Russia's warfighting military capabilities with an emphasis on strategic (i.e., nuclear) deterrence. Besides the assurance of adequate readiness levels by the Russian military in order to respond so all kinds of conflict scenarios, including at the strategic level, the respective forces should also make sure that the Kremlin is timely informed of any incoming attack, including from air and space (!). While the 2010 Military Doctrine does not specify a geographic direction or adversary, however, if the military task

[798] Schmidt, H.-J./Müller, H. (2010): Zwischen nationaler Selbstbehauptung und Kooperationssignalen: zur Einschätzung der neuen russischen Militärdoktrin, pp. 3-5, Hyperlink: https://nbn-resolving.org/urn:nbn:de:0168-ssoar-292406 (Last visit: 04.02.2023).

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list read in conjunction with Russia's list of 'military dangers', Russia's focus in the doctrine was clearly NATO with its member states.

(3) *Retain/increase the role of nuclear weapons in the military doctrine (hard)*: a hard posture
The 2010 Military Doctrine reiterated the Kremlin's view on the use of nuclear weapons that has already been given ten years before in the 2000 Military Doctrine. In essence, Russia considers the use of nuclear weapons legitimate when another country or group of countries attack Russia (or one of its allies – extended deterrence) a legitimate ground for nuclear retaliation. Furthermore, Russia sees itself legitimated to use nuclear weapons against any conventional attack in case that the existence of Russia's statehood is threatened.

(4) *Strengthen military capability development in order to close the capability gap with the defender/protégé (hard)*:
Regarding the military capability development of Russia, it should first be noted that Russia unilaterally suspended the 1990 CFE Treaty that had restricted Russian military deployments on its territory in the 'northern and southern flank regions' (see subchapter 4.2.2). Furthermore, considering that Russia might not have been honest in its commitments regarding the 1987 INF Treaty provisions[799] with a view to the development and deployment of the INF-non-compliant SSC-8[800]. Against this context, the provision of the 2010 Military Doctrine remains clear that Russia wanted to step up its efforts in the development of modern military capabilities in order to adequately equip its armed forces for a potential large-scale military conflict.

4.3.3 Russia's post-Cold War conventional and nuclear military capabilities

This subchapter consists of the further subchapters 4.3.3.1 to 4.3.3.5 which were compiled and evaluated on the basis of the quantitative methodology as introduced in subchapter 4.1.1.2. The first subchapter 4.3.3.1 provides an introduction to the complex issue of Russia's conventional and nuclear military capabilities with a brief historical overview of the role of Russia's armed forces in the post-Cold War era followed by the examination of the basic financial and personnel data of Russia in comparison to NATO and the U.S. The subsequent subchapter 4.3.3.2 to

[799] The seriousness of Russia's compliance to the 1987 INF Treaty was questioned by the U.S. already in 2013 on the basis of intelligence information about the newly developed Russian SSC-8 missile, see: NATO (2019): NATO and the INF Treaty, August 2019, Hyperlink: https://www.nato.int/cps/en/natohq/topics_166100.htm (Last visit: 07.09.2022).
[800] Missile Threat (2022): 9M729 (SSC-8), Hyperlink: https://missilethreat.csis.org/missile/ssc-8-novator-9m729/ (Last visit: 09.12.2022).

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4.3.3.5 are dedicated to a specific domain as defined in subchapter 4.1.1.2. The overall results are collected and presented in conjunction with the results from subchapter 4.3.2 in the interim conclusion on Russia's threat posture throughout the examined periods in subchapter 4.3.4.

4.3.3.1 Introduction

Considering the key role of military forces in the Soviet politico-military strategic thinking, Russia's armed forces have begun the post-Cold War era with a heavy-weight legacy.

One central aspect that was the continuity of Soviet military strategic thinking to the Russian national armed forces. Considerable numbers of military personnel of Russian citizenship just continued their service under a new flag. Furthermore, Russia's military saw itself in the tradition of the victorious Red Army that had successfully cast down their ideological mortal enemy, the Third Reich, in 1945. Thus, giving up the territorial presence in Eastern Europe, especially its position in Eastern Germany, was no light feat for the revised Russian armed forces and took considerable time to achieve. Lastly, it was the Soviet military forces that principally enabled the Soviet Union political elites to shape the world order as the second global superpower next to the U.S. throughout the Cold War.[801]

There were further nuances, such as the Soviet military as an important domestic power factor inside the USSR that extracted comprehensive amounts of economic and personnel resources from the state. These elements cannot be highlighted in more detail at this point, because this subchapter is focussed on the military capabilities of the Russian Federation in the post-Cold War era. However, it should be stressed that when the Soviet Union fell apart at the end of 1991, the subsequent 'shockwave' in military affairs had hit Russia and its military force underwent unrestrained hardship, especially due to decay of Russia's military capabilities in view of the comprehensive political and economic transformation of the country throughout the 1990s.

With the change of the domestic power structure in Russia, the President of the Russian Federation had overtaken the Communist party's role as the military's key link to the political system and thus, the resources of the state. As a consequence, the Russian armed forces depended heavily on the sponsorship of the individual that headed the Kremlin.[802] In the 1990s, when President Yeltsin ruled the country, the military had not received particular prioritisation,

[801] Trenin, D. (2004): Conclusion: Gold Eagle, Red Star, pp. 217-219. In: *Trenin, D./Miller, S. (eds): The Russian Military: Power and Policy. American Academy Studies in Global Security, 2004.*

[802] Baev, P. (2002): The Plight of the Russian Military: Shallow Identity and Self-defeating Culture, pp. 129-135.

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besides the retention of its nuclear arsenal. Zagare and Kilgour compared the subsequent Russian defence policy with the one of France between the two world wars.

> "During the inter-war years, the French […] relied on an all-or-nothing posture. The French plan was to depend on the defensive advantages provided by **"massive firepower'" to deter attacks**. […] Much the same could be said about **Russian defense policy in the 1990s**. The essential difference, of course, is that the **current Russian threat is primarily nuclear**, while the French threat throughout the 1930s was conventional." (Zagare/Kilgour)[803]

With the advent of President Putin in the Kremlin in the year 2000, the situation for Russia's conventional armed forces began to change slowly but surely. As Putin's grip on the power in the country's key decision-making circles of politics and economy grew, the Russian military was tasked to conduct reforms for furthering professionalisation of its military personnel (i.e., creation of a smaller force based on better trained contracted soldiers and less reliance on unmotivated conscripts) and modernisation of its military capabilities (e.g., better maintenance of old conventional equipment and modernisation, including development of new military capabilities).[804] The modernisation coincided to no small existent with the increasingly assertive nature of Russia's foreign policy following the country's internal consolidation (i.e., this included the successful execution of the Second Chechen War from 1999 to 2006).[805]

Given that the adaption of military forces usually evolves around the notion of a military reform, there were different attempts to adjust Russia's post-Cold War era forces to the contemporary politico-military challenges. The reforms were not as successful as envisaged in accordance with Trenin. The basic bureaucratic system of the Russian Ministry of Defence that consisted basically of uniformed officers up to the top, where a retired former General was positioned as Minister of Defence, remained rather inert to radical changes.[806]

Summarising the military reforms throughout the presidencies of Yeltsin, Putin and Medvedev, the Yeltsin era (1992-1999) had basically scaled down defence expenditures to a massive extend in comparison with the USSR spending levels. The military branches of the military were reduced from five to three and cuts in military personnel as well as military equipment in both maintenance and procurement were performed throughout the remaining parts of the military (the nuclear forces suffered comparably less from that drawdown than the ground forces). The military's power base thus shifted from a massive conventional capability together

[803] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 200.
[804] Baev, P. (2002): The Plight of the Russian Military: Shallow Identity and Self-defeating Culture, pp. 137-141.
[805] Krupnov, Y. (2006): Defense Reform and the Russian Navy, pp. 24-26, Hyperlink: https://www.ndc.nato.int/download/downloads.php?icode=129 (Last visit: 11.02.2023).
[806] Trenin, D. (2004): Conclusion: Gold Eagle, Red Star, pp. 227-230. In: *Trenin, D./Miller, S. (eds): The Russian Military: Power and Policy. American Academy Studies in Global Security, 2004.*

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with a strong strategic nuclear deterrent towards a reliable but numerically reduced strategic nuclear deterrent with an increasingly weakened conventional capability.

In the Putin era (2000-2007), military expenditures slightly recovered and further reforms were conducted in order to prepare the Russian armed forces for the 21st century high-tech warfare that the Kremlin expected after noticing the U.S. efforts in enhancing and digitalising its armed forces with precision-guided munitions, long-range strike capabilities, ballistic missile defence systems, and professionalisation of soldiers. Furthermore, new forms of conflict, such as the asymmetric warfare that Western militaries were increasingly facing in their crisis management operations also influenced the Kremlin's modernisation plans for its own military forces (e.g., in no small part due to the fact that Russia conducted the asymmetric Second Chechen War at the time).

Shortly after the beginning of the Medvedev era (2008-2012), Russia became military active in a regular symmetric military conflict, the 2008 Russo-Georgian War. Based on the military execution of this war, Russia's armed forces had gained valuable lessons learned that required further adaptation in order to prepare the country's military for "real" peer-military conflicts. Among the shortfalls discovered were lack of air and close air support due to strong air defence systems of Georgia, limited precision-strike capabilities, lack of adequately armoured vehicles, insufficient training throughout Russia's forces, and more. The success story of the 2008 Russo-Georgian War was basically dependent on the overwhelming firepower of traditional artillery and excessive numbers of military troops.[807]

After the war, Russia began its latest iteration of military reforms, named 'New Look'. Equipped with the knowledge about the shortcomings of the Russian Armed Forces, adaptions in the structure as well as modernisation of force equipment was conducted.[808] The modernisation programme was planned to be completed by 2020, after which date the "new" Russian military forces should have a capable nuclear deterrent as well as a large conventional force (including the continuation of the conscript system, but with more contracted soldiers; all better trained in higher combat readiness levels).[809]

[807] De Haas, M. (2011): Russia's Military Reforms: Victory after Twenty Years of Failure?, pp. 7-20, Hyperlink: https://www.clingendael.org/sites/default/files/pdfs/20111129_clingendaelpaper_mdehaas.pdf (Last visit: 11.02.2023).

[808] IISS (2022): If New Looks could kill: Russia's military capability in 2022, Hyperlink: https://www.iiss.org/blogs/military-balance/2022/02/if-new-looks-could-kill-russias-military-capability-in-2022 (Last visit: 23.01.2023).

[809] De Haas, M. (2011): Russia's Military Reforms: Victory after Twenty Years of Failure?, pp. 28-30 and pp. 34 f., Hyperlink: https://www.clingendael.org/sites/default/files/pdfs/20111129_clingendaelpaper_mdehaas.pdf (Last visit: 11.02.2023).

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For the analysis of the overall military capabilities of Russia's armed forces throughout the timeframe under examination in this dissertation, subchapter 4.3.3 provides a very brief analysis of Russia's defence expenditures per GDP in percentage in comparison to the arithmetic averages of NATO-total, NATO-Europe (i.e., NATO without Canada and the U.S.) and the U.S. individual expenditure that were included due to the U.S. role as defender in the game.
It should furthermore be noted that some columns in the tables of this subchapter as well as in the subchapters 4.3.3.2 to 4.3.3.5 are marked as '**bold**'. These parts are the key elements for the capability analysis for each of the three periods under examinations (i.e., 'Initial post-Cold War era', 'After the first decade of the post-Cold War era', and 'After the second decade of the post-Cold War era'). The further data in the Table 36 represent references in order to determine if the reference year of the timeframes are outlier statistics or not.

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
Russia	**4,43**	3,78	2,73	**3,55**	3,30	3,12	**3,59**	3,85	4,11
NATO total – arithmetic average	**2,58**	2,19	2,00	**1,89**	1,79	1,67	**1,64**	1,47	1,44
NATO-Europe only – arithmetic average	**2,45**	2,12	1,97	**1,86**	1,73	1,58	**1,53**	1,39	1,37
U.S.	**4,97**	3,86	3,20	**3,12**	4,02	4,08	**4,92**	4,05	3,70

Table 36: Overview on the defence expenditures per GDP in percentage 1992-2014, triennially compiled data plus 2014[810] *[own description]*

A quick review of the defence expenditures of Russia in comparison to the arithmetic averages of NATO total as well as NATO-Europe shows that Russia had placed a higher value on its military security than the 'collective' of NATO's member states. The U.S. remained ahead of Russia in defence spending throughout the timeframe, as displayed in Table 36, except for two years: 2001 and 2014. There could be different explanations, why these two incidences occurred (e.g., one of the countries might have been at war at the time or was undergoing military modernisation/re-equipment). While Table 36 should not be further examined in detail due to the focus on military capabilities, it, nevertheless, provides a situational picture on the prioritisation of military security among those three players. NATO's collective of member states pursued a continuous downshift in defence expenditures in those two decades, while the U.S. began to steer to higher levels of defence spending from the early 2000s onward. Russia's defence expenditures dropped considerably in the 1990s, but began to recover with the beginning of the Putin era. At the end of the timeframe under examination, Russia's defence budget showed a clear rising trend.

[810] SIPRI (2022): SIPRI Military Expenditure Database, Hyperlink: https://milex.sipri.org/sipri (Last visit: 23.12.2022

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Furthermore, since the basic economic factors usually drawn upon consist of resources and personnel, a look at the military personnel development across the examined timeframe is taken in Table 37.

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
Russia	**1.900**	1.800	1.702	**1.386**	1.452	1.476	**1.430**	1.260	1.287
NATO total	**5.154**	4.865	4.747	**4.476**	4.632	4.540	**4.465**	4.223	4.147
NATO-Europe only	**3.152**	3.153	3.083	**2.990**	3.088	2.921	**2.830**	2.724	2.695
U.S.	**1.920**	1.636	1.594	**1.421**	1.473	1.555	**1.569**	1.433	1.381

Table 37: Number of Military Personnel (in thousand) 1992-2014, triennially compiled data plus 2014[811] [own description]

The data of NATO total and NATO-Europe both show where a military alliance can excel in. When a few member states with large populations or many member states with smaller populations add up their military personnel, they can quickly outnumber Russia's forces. In contrast to the defence expenditures in Table 36, the military personnel numbers also show the impact of NATO's three enlargements (especially 1999 and 2004, as well as 2009) to a very marginal extent. In view of the U.S. military force quantities, Russia did perform not too bad in accordance with Table 37. The divide between both military powers amounted to not more than 200.000 soldiers across the timeframe under examination. For an individual country, Russia is therefore quite capable and NATO strongly relies on the commitment by each member state to contribute to a joint force posture, when challenged by Russia.

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
Russia:NATO	**0,37:1**	0,37:1	0,36:1	**0,31:1**	0,31:1	0,33:1	**0,32:1**	0,3:1	0,31:1
Russia:NATO-Europe	**0,6:1**	0,57:1	0,55:1	**0,46:1**	0,47:1	0,51:1	**0,51:1**	0,46:1	0,48:1

Table 38: Military Personnel Ratio between Russia and NATO, as well as Russia and NATO-Europe in comparison [own calculation]

Based on the method of calculating the ratio between forces, as established in subchapter 4.1.2.2, the Russian military's personnel numbers in the post-Cold War era were never 'capable' in order to provide a credible threat posture against the military alliance (see Table 30).

It might be wise, however, to also make use of alternative statistics in order to verify if that situational picture can truly be validated. The data comparison between the 2022 Statista dataset

[811] Data derived from the World Bank in 2022. Furthermore, the following World Bank definition applies: "Armed forces personnel are active duty military personnel, including paramilitary forces if the training, organization, equipment, and control suggest they may be used to support or replace regular military forces." WorldBank (2022): Armed forces personnel – total, Hyperlink: https://data.worldbank.org/indicator/MS.MIL.TOTL.P1 (Last visit: 08.01.2022).

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and the 2022 NATO Projected Global Firepower dataset provides a puzzling answer to the issue of verification (see Table 39).

	2022 Statista based on Global Firepower and SIPRI			*2022 NATO Projected Global Firepower*		
	NATO	*Russia*	*Russia:NATO*	*NATO*	*Russia*	*Russia:NATO*
Total military personnel	5.405.700	1.350.000	0,25:1	N/A	N/A	N/A
Active soldiers	3.366.000	850.000	0,25:1	N/A	N/A	N/A
Reserve forces	1.301.000	250.000	0,19:1	N/A	N/A	N/A
Paramilitary units	738.700	250.000	0,34:1	N/A	N/A	N/A
Combined Manpower	N/A	N/A	N/A	466.590	825.000	1,77:1
Frontline Manpower	N/A	N/A	N/A	336.690	637.500	1,89:1
Reserve Manpower	N/A	N/A	N/A	129.900	187.500	1,44:1

Table 39: Alternate datasets for a Russia:NATO comparison per air domain capability, reference year: 2022[812] *[own calculation]*

The result is not surprising insofar as NATO requires its member states to commit their forces on the basis of national decision-making. The 2022 Statista dataset principally assumed that every country of NATO provides it full armed forces to a conflict with Russia, while the 2022 NATO Projected Global Firepower dataset just assumed that NATO's member states provide ten percent of their existing military capabilities to such a conflict (meanwhile, Russia has only 75 percent availability of its own forces in that dataset).

Thus, it can be concluded that it is decisive for NATO to get its member states to commit 'boots on the ground'. The NATO countries with exposed borders to Russia would most likely commit more than the ten percent of their military forces to such a conflict (especially if they were the victim of Russia's military threat). However, if a NATO member with a relatively large military has (1) a greater geographic distance to the conflict region (e.g., Baltics), and (2) does not consider Russia as unitary adversary to its military security, deployments of those state's armed forces into the conflict might be more limited, thus enabling Russia potentially an advantage in military force quantities. This commitment factor is going to further tested in the subchapters 4.3.3.1 to 4.3.3.4, because it has grave implications for Russia's threat posture.

[812] Compare: Statista (2022): Comparison of the military capabilities of NATO and Russia as of 2022, Hyperlink: https://www.statista.com/statistics/1293174/nato-russia-military-comparison/ (Last visit: 25.01.2023); with: GFP (2022): 2022 NATO Projected Global Firepower, Hyperlink: https://www.globalfirepower.com/nato-projected-firepower.php (Last visit: 25.01.2023).

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4.3.3.2 Air domain capabilities

When the Soviet Union dissolved at the end of 1991, the Soviet armed forces had two specific branches of the air force: The Air Force (VVS) as well as the Air Defence Force (PVOS).[813] Throughout the post-Cold War era, Russia's air force underwent two decisive reforms. The first one was a military reform introduced by a Presidential decree in July 1997 that merged previous Air Defence Force and Air Force of Russia under one command together with a downshift in force sizes. The formal branch integration was completed in March 1998.[814]

Russia's Air Force was tasked with a wide range of duties that included the following operational requirements:

> "[…]
> - repulsing aggression in the aerospace sphere and protecting from air attacks the control points of the highest state and military control, administrative-and-political centres, industrial-and-economic areas, the most important economic facilities, the country's infrastructure and the groups of troops (forces);
> - destruction of enemy objects and troops using both conventional and nuclear ordnance;
> - providing combat troops of other armies and armed services for air support." (Ministry of Defence of the Russian Federation)[815]

After a number of further military reforms between 2009 and 2011, a further restructuration of the force structure was undertaken in order to simplify the maintenance of the aircraft. However, following a personnel shift in the Russian General Staff, those reforms were withdrawn and the Air Force returned at least partially to the previous structure due to operational and doctrinal requirements for the air force unit formations.[816] In August 2015, the Air Force underwent yet another reform that merged the air force branch with Russia's Space Force in order to eventually become the Aerospace Force (*Vozdushno-Kosmicheskiye Sily* / VKS) of the Russian Federation. Following the merger, the Aerospace Force was tasked with further duties encompassing launch and operation of military and dual-use satellites as well as Russia's defence against space-based threats.[817]

From a capability point of view, the VKS requires relatively high defence investments in order to keep up with the research & development efforts of other potential competitors in the air domain, most notably the U.S. Based on the experiences made by observing NATO's 1999

[813] Myers, N. (2018): The Russian Aerospace Force, p. 96.
[814] Ministry of Defence of the Russian Federation (n.a.): Air Force, Hyperlink: https://eng.mil.ru/en/structure/forces/air.htm (Last visit: 21.01.2023).
[815] Ministry of Defence of the Russian Federation (n.a.): Air Force, Hyperlink: https://eng.mil.ru/en/structure/forces/air.htm (Last visit: 21.01.2023).
[816] Myers, N. (2018): The Russian Aerospace Force, pp. 96 f.
[817] CIA World Factbook (2022): Russia - Military and Security section, Hyperlink: https://www.cia.gov/the-world-factbook/countries/russia/#military-and-security (Last visit: 05.12.2022).

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Kosovo air campaign and its 2011 Libya air campaign as well as the dominant impact of the U.S. Air Force in the two Iraq campaigns of 1990/91 and 2003, wherein the capable Western air forces quickly gained air superiority and subsequently decimated the adversarial ground forces, Russia prioritised the VKS from an operational perspective for preventing a capability gap. Furthermore, given the vast territory that the Russian military has to defend, aspiring the establishment of a strong air force was also a reasonable decision from a politico-military strategic point of view in order to preserve Russia's national sovereignty from Western Russia to the Russian Far East.[818]

A further decisive moment for the Russian air force was the 2008 Russo-Georgian War that displayed weaknesses of this military branch due to aged equipment and lack of personnel. As a result, Russia invested increasingly in multi-role combat aircraft. In addition, long-range cruise missiles for ground attacks were developed on the basis of existing missile types that were previously only used with nuclear warheads as part of the air-based nuclear deterrence. The platforms that carried and launched these conventional cruise missiles were the Tu-95 Bear H and Tu-160 Blackjack A heavy bombers (similar patterns could be observed in the U.S. Air Force which began to use its own heavy bombers for conventional attacks in conflicts).[819]

In terms of military equipment, the Russian Aerospace Force operate Bombers, Fighters, Fighters/Ground Attack and Attack/Ground Attack aircraft, Electronic Intelligence aircraft, Tankers, Airborne early warning and control, Command and control, as well as transports.

While the rDMC dataset provides information for all of those categories to a different degree of granularity, a total of four rDMC categories are selected for this capability analysis in order to focus on the most essential capabilities for air and ground operations 'proper', namely Bombers, Fighters, Ground/Attack aircraft, and Transports. Figure 9 gives is an overview of Russia's air domain capabilities for the timeframe 1992-2014 with triennially compiled data.

[818] Myers, N. (2018): The Russian Aerospace Force, pp. 90 f.
[819] IISS (2022): If New Looks could kill: Russia's military capability in 2022, Hyperlink: https://www.iiss.org/blogs/military-balance/2022/02/if-new-looks-could-kill-russias-military-capability-in-2022 (Last visit: 23.01.2023).

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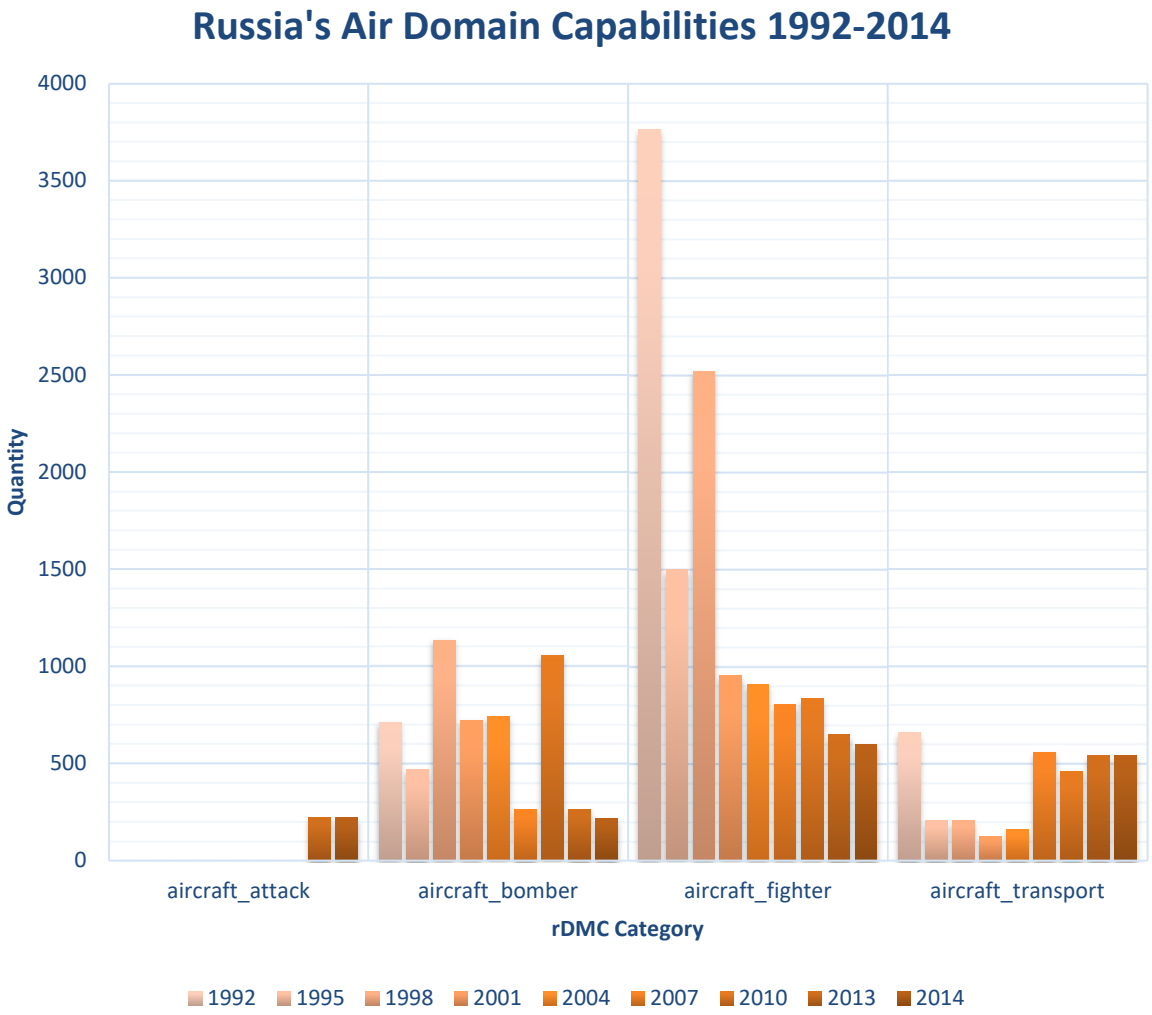

Figure 9: Russia's air domain capabilities 1992-2014, triennially compiled data plus 2014[820] *[own illustration]*

The data in Figure 9 were collected for the rDMC dataset from a research team of the Center for Peace and Security Studies at the University of California, San Diego. Particularly noteworthy in that virtual display of the selected aircraft are the absence of dedicated aircraft_attack and the relatively strong fluctuations between triennially extracted data.

Given that the IISS MB editions, from which rDMC's raw data was extracted, has applied different definitions for types of military capabilities throughout time, as well as sometimes missing data, the specific rDMC data output for Russia in the air domain should be taken with caution.

[820] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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Based on the quantitative methodology in subchapter 4.1.2.2 and the available rDMC data, Table 40 provides the calculation of the Russia:NATO military capability ratios throughout the period of examination. Due to the absent data on aircraft_attack, no calculations could be made for the majority of triennial dataset up to 2010. As in the previous subchapter 4.3.2, the data from the timeframe under examination (i.e., 'Initial post-Cold War era', 'After the 1st decade of the post-Cold War era', and 'After the 2nd decade of the post-Cold War era') is marked in '**bold**'.

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
aircraft_attack	**NA**	NA	NA	**NA**	NA	NA	**NA**	0,53:1	0,58:1
aircraft_bomber	**1,15:1**	1,09:1	2,97:1	**1,75:1**	2,34:1	0,78:1	**4,41:1**	1,07:1	0,89:1
aircraft_fighter	**1,95:1**	0,69:1	1,59:1	**0,59:1**	0,64:1	0,63:1	**0,86:1**	0,57:1	0,52:1
aircraft_transport	**0,23:1**	0,07:1	0,09:1	**0,05:1**	0,06:1	0,29:1	**0,24:1**	0,23:1	0,23:1

N/A = no ratio calculable due to missing data for Russia and NATO

Table 40: Russia:NATO Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[821] [own calculation]

On the basis of these ratios, it must be concluded that the Russian air domain capabilities have considerably deteriorated from 1992 onward till 2014. In view of the quantitative methodology, Russia was 'capable' in two of four categories in 1992, and fell to one in four categories in 2001 and 2010.

The only competitiveness of Russia in the air domain lies within the aircraft_bomber category, which is a logical consequence of nuclear-related operational tasks that these types of aircraft would be required to fulfil in times of a major military conflict with another potentially nuclear-armed power or military alliance.

Table 41 provides the ratios for Russia's and NATO-Europe's military capabilities for the four selected rDMC categories; Canada and the U.S. were removed from the dataset.

In line with the quantitative methodology from subchapter 4.1.1.2, Russia was capable in two of four categories in 1992, while it was only capable in one of four categories in 2001 and 2010. Given that NATO-Europe as a 'zero' amount of aircraft_bomber (which is ≠ NA), Russia receives a dominance attribution for that category (abbreviated 'RUS dom.' in the table). The 2007 ratio for aircraft_bomber should be considered a data artefact due to shifting definitions throughout the different edition of the IISS Military Balance.

	1992	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
aircraft_attack	**NA**	NA	NA	**NA**	NA	NA	**NA**	3,73:1	3,33:1

[821] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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aircraft_bomber	**9,04:1**	14,21:1	RUS dom.	**RUS dom.**	RUS dom.	(5,35:1)	**RUS dom.**	RUS dom.	RUS dom.
aircraft_fighter	**2,54:1**	0,84:1	1,92:1	**0,69:1**	0,72:1	0,63:1	**0,87:1**	0,98:1	0,86:1
aircraft_transport	**0,62:1**	0,18:1	0,24:1	**0,14:1**	0,17:1	0,52:1	**0,47:1**	0,67:1	0,66:1

N/A = no ratio calculable due to missing data for Russia and NATO
Rus dom. = Russia is dominant in that capability/no comparable NATO capability

Table 41: Russia:NATO-Europe Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[822] [own calculation]

Taking into account the shortfalls of the rDMC in terms of data quality in the different triennials and 2014, the two alternative datasets are taken as a point of reference for validating the results. Taking into account that different datasets apply different categorial definitions, the combination of the individual data categories in Table 42 were selected for the validation of the rDMC's analysis outcome: Total aircraft serves as a general point of reference, the Fighters/Interceptors are an approximation to aircraft_fighter, ground attack aircraft is a combination of aircraft_ground attack and aircraft_bombers; and lastly, transport aircraft compare to aircraft_transport.

	2022 Statista based on Global Firepower and SIPRI			*2022 NATO Projected Global Firepower*		
	NATO	*Russia*	*Russia:NATO*	*NATO*	*Russia*	*Russia:NATO*
Total aircraft	20.723	4.173	0,2:1	2.074	3.130	1,51:1
Fighters/Interceptors	3.527	772	0,22:1	353	579	1,64:1
Ground Attack aircraft	1.048	739	0,71:1	105	554	5,28:1
Transport aircraft	1.543	445	0,29:1	154	334	2,17:1

Table 42: Alternate datasets for a Russia:NATO comparison per air domain capability, reference year: 2022[823] [own calculation]

The comparison between Russia and NATO (total) in the 2022 Statista dataset shows a glaring divide between the full potential of NATO in the air domain against a very limited Russian landscape of air assets. NATO's overall sum of aircraft far exceeds the number of Russian aircraft. From the three specialised military capabilities from the air domain, Russia remains far behind NATO except in the category of Ground Attack aircraft wherein Russia could turn the tide, but that requires NATO's member states not committing their full air defence potential

[822] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).
[823] Compare: Statista (2022): Comparison of the military capabilities of NATO and Russia as of 2022, Hyperlink: https://www.statista.com/statistics/1293174/nato-russia-military-comparison/ (Last visit: 25.01.2023); with: GFP (2022): 2022 NATO Projected Global Firepower, Hyperlink: https://www.globalfirepower.com/nato-projected-firepower.php (Last visit: 25.01.2023).

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(in terms of Fighters/Interceptors, as well as ground-based air defence systems that are not covered in this analysis).

In contrast to the 2022 Statista dataset, Russia's military capability potential in accordance with the 2022 Projected NATO Global Firepower dataset, Russia has an advantage if NATO's individual member states do not sufficiently commit aircraft to a NATO-Russia conflict. In essence, NATO's air force is in no category of aircraft dominant enough that ten percent of each of its national air forces would be sufficient to break the 1:1 ratio towards Russia. Thus, Russia might be absolutely 'capable' if NATO's member states do not deploy at least the double number of aircraft that the 2022 Projected NATO Global Firepower dataset assumed in a conflict scenario between Russia and NATO.

4.3.3.3 Land domain/effects capabilities

The Russian army *or* ground forces are the largest military branch of the Russian Federation that is dominated by considerable numbers of Tank Troops, Motorized Rifle Troops, as well as Missile Troops and Artillery.[824]

Based on its historical experience throughout time, Russia attributes its ground forces a key role for the defence of the country. Following the end of the Cold War, the tremendous financial burden of the Soviet military policy was based on comprehensive conscription in combination with the cadre system (i.e., military formations that consist of a very limited amount of military personnel, mainly officers, that is filled up by conscripts in case of conflict).[825]

From a holistic military perspective, the ground forces continue to play an essential role for Russia's defence and military policy regardless of the post-Cold War trend in other countries to adapt their troops for asymmetric warfare typical in crisis management operations:

> "Moscow continues to place **primary importance on conventional military force**, with the direct intention of **growing capability in order to challenge U.S. power**. While the United States and other Western militaries are considering their future form after two decades of focus on counterinsurgency, **for Russia** the picture is different; **strong emphasis on the enduring and central role of numerous conventional land forces remains unchallenged**." (Rogovoy/Giles)[826]

[824] FAS (2020): US Army Training and Doctrine Command, January 2020, Appendix B "Quick Facts", p. 37, Hyperlink: https://irp.fas.org/world/russia/tradoc-refguide.pdf (Last visit: 21.01.2023).
[825] Thornton, R. (2011): Military Modernization and the Russian Ground Forces, pp. 3 f., Hyperlink: https://press.armywarcollege.edu/cgi/viewcontent.cgi?article=1576&context=monographs (Last visit: 21.01.2023).
[826] Rogovoy, A./Giles, K. (2015): A Russian View on Landpower, summary p. ix, Hyperlink: https://apps.dtic.mil/sti/pdfs/ADA617190.pdf (Last visit: 21.01.2023).

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In this sense, the Russian army's force formations[827] encompass the combination of the regular branches of arms. The tank troops are decisive for offensive ground operations, but also offer added value for defensive tasks in conjunction with the infantry troops:

> "The **Tank Troops** are the Arm and the **main strike force** of the Land Force. They are mainly **used in conjunction with the Motorised Rifle Troops** in the main areas and perform the following tasks:
>
> - in defence – on **direct support of the Motorised Rifle Troops** in repelling the enemy's offensive and application of counter-attacks and counter-strikes;
> - in offence – on delivering **powerful cleave strikes** deeply, developing success, defeating the enemy in meeting engagements and battles." (Ministry of Defence of the Russian Federation)[828]

The majority of the Russian ground forces consists of Motorised Rifle Troops, which are basically regular infantry mobilised by different kinds of vehicles. In the Russian military doctrine, these troops operate often alongside Tank Troops:

> "The **Motorised Rifle Troops** are the **most numerous Arm of the Service**, which forms the basis of the Land Force and the core of its combat orders. Along with the Tank Troops they perform the following tasks:
>
> - in defence – to **retain occupied areas, lines and positions, to repulse the enemy's attacks** and **defeat its attacking groups**;
> - in offence (counterattack) – to **break through the enemy's defence**, to **destroy factions of its troops**, to capture **important areas, lines and objects**, to cross water obstacles, to persecute the retreating enemy;
> - in meeting engagements and fights – to act being a part of sea and airborne assault tactical landings." (Ministry of Defence of the Russian Federation)[829]

Lastly, the Russian military employs a considerable amount of artillery (self-propelled or towed tube artillery as well as multiple rocket launcher).

> "The **Missile Troops and Artillery** (MT&A) are an Arm of the Land Force, which is the **primary means of fire and nuclear destruction** of the enemy during conduct of **combined-arms operations** (combat actions). They are designed to perform the following main tasks:
>
> - achievement and keeping of **fire superiority over the enemy**;
> - **defeat of its means of nuclear attack, manpower, weapons, military** and special equipment;
> - disruption of troops and weapons' control systems, reconnaissance and electronic warfare;
> - **destruction of long-term defence installations** and other infrastructure;
> - disruption of operational and military logistics;
> - weakening and isolation of the second echelons and reserves of the enemy;

[827] For an overview on hierarchy and generic size of Russia's force formations, including a comparison to Western force formations, see no V. in the appendices.
[828] Ministry of Defence of the Russian Federation (n.a.): Motorised Rifle Troops, Hyperlink: https://eng.mil.ru/en/structure/forces/ground/structure/motorised.htm (Last visit: 21.01.2023).
[829] Ministry of Defence of the Russian Federation (n.a.): Tank Troops, Hyperlink: https://eng.mil.ru/en/structure/forces/ground/structure/tank.htm (Last visit: 21.01.2023).

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- **destruction of tanks and other armoured vehicles of the enemy** breaking into the depth of defence;

[…]" (Ministry of Defence of the Russian Federation)[830]

In regard to the post-Cold War era military reform process, Russia's ground forces underwent three phases. Following the dissolution of the Soviet Union, then-President Yeltsin was mainly concerned with cost savings for the newly founded Russian Federation. Considering that the ground forces was one of the main employers of young Russian conscripts and a strong overhead of officer personnel, attempts by Yeltsin to turn the Russian armed forces generally into a professional military met considerable resistance.[831]

The next phase began with the inauguration of Yeltsin's successor, Vladimir Putin, as President of the Russian Federation in the year 2000 in moving from cutting costs to turning the Russian military into an instrument of the Kremlin's new-found geopolitical level of ambition. The balance between cost of reform and political will led to the selective revision of specific formations, such as the airborne forces and marines.[832]

Lastly, the Russo-Georgian War of 2008 had been a true game changer regarding the Russian military's force structure with a special emphasis on its ground troops. Until the 2008 war, the Russian army followed the basic divisional structure[833] of the Soviet armed forces that proved inflexible and difficult to command in a modern war that Russia was fighting in Georgia. Subsequently, the force structure of many (but not all) military units was moved to a system closer to those of the U.S. or UK, which consisted of brigades. Furthermore, the hierarchical command and control system was shortened to achieve a quicker reaction time in warfighting.[834] In 2012, a further reform of the sub-brigade military formation was undertaken through the reconstitution of military units into Battalion Tactical Groups (*or* BTGs), which proved an ill-fated attempt at turning the Russian ground forces into flexible small groupings.

[830] Ministry of Defence of the Russian Federation (n.a.): Missile Troops and Artillery, Hyperlink: https://eng.mil.ru/en/structure/forces/ground/structure/rvia.htm (Last visit: 21.01.2023).

[831] The system of contracted personnel (*kontraktniki*) still stayed in effect from the 1990s onward. See: Thornton, R. (2011): Military Modernization and the Russian Ground Forces, pp. 3-11, Hyperlink: https://press.armywarcollege.edu/cgi/viewcontent.cgi?article=1576&context=monographs (Last visit: 21.01.2023).

[832] Thornton, R. (2011): Military Modernization and the Russian Ground Forces, pp. 11-13, Hyperlink: https://press.armywarcollege.edu/cgi/viewcontent.cgi?article=1576&context=monographs (Last visit: 21.01.2023).

[833] See V. Military force structure in the Appendices for further background of the Russia's and Western force formations.

[834] Thornton, R. (2011): Military Modernization and the Russian Ground Forces, pp. 16-26, Hyperlink: https://press.armywarcollege.edu/cgi/viewcontent.cgi?article=1576&context=monographs (Last visit: 21.01.2023).

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More recent lessons learnt from the 2022 Russian invasion showed that divisional arrangements with larger (artillery) firepower proved more effective in a symmetric conflict.[835]

In terms of military capability development, Russia did not prioritise the ground forces *per se* in their modernisation programmes after 2008. Upgrades that occurred since the 2008 Russo-Georgian War were undertaken especially for heavy artillery and multiple rocket launcher systems that proved quite effective in those conflicts, where Russia's military was involved in (2015 Syria and 2014 Ukraine). As a disadvantage to the life-extension programmes of older equipment, the standardisation in favour of modern post-Soviet equipment began to suffer as a consequence.[836] Nevertheless, the Russian land defence industry proved its standing through the development of different new or considerably updated variants of military equipment. One of the most noteworthy examples has been the T-14 Armata main battle tank, which was only seen at military parades in the timeframe of this dissertation (e.g., the 2015 Military Victory Day Parade).[837]

Moving from a general perspective on Russia's ground forces to the examination of the rDMC categories, a selection of relevant land-based and land effects capabilities is subsumed in Figure 10 below.

The reason for the address of land domain in conjunction with land effects capabilities rests in the rDMC dataset that combines land surface-to-surface artillery and missiles with those launched from platforms at sea. The two categories with a cross-domain notation in its origin, 'land/sea defence_surface to surface artillery' and 'land/sea defence_surface to surface missiles', therefore require the change in the domain's title.

Furthermore, taking into account that there is no further granular information in these two categories, the caveat must be accepted that some of those capabilities counted in Figure 10 belong to naval assets that are e.g., equipped with land-attack cruise missiles or naval guns that can be used to attack targets at land.

In addition, the rDMC did not contain any data for Russia's anti-tank/anti-infrastructure_artillery. Therefore, no calculation for a ratio with NATO's respective quantities can be conducted.

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[835] IISS (2022): If New Looks could kill: Russia's military capability in 2022, Hyperlink: https://www.iiss.org/blogs/military-balance/2022/02/if-new-looks-could-kill-russias-military-capability-in-2022 (Last visit: 23.01.2023).

[836] US Congressional Research Service (2020): Russian Armed Forces: Capabilities, p. 1, Hyperlink: https://sgp.fas.org/crs/row/IF11589.pdf (Last visit: 22.01.2023).

[837] IISS (2022): If New Looks could kill: Russia's military capability in 2022, Hyperlink: https://www.iiss.org/blogs/military-balance/2022/02/if-new-looks-could-kill-russias-military-capability-in-2022 (Last visit: 23.01.2023).

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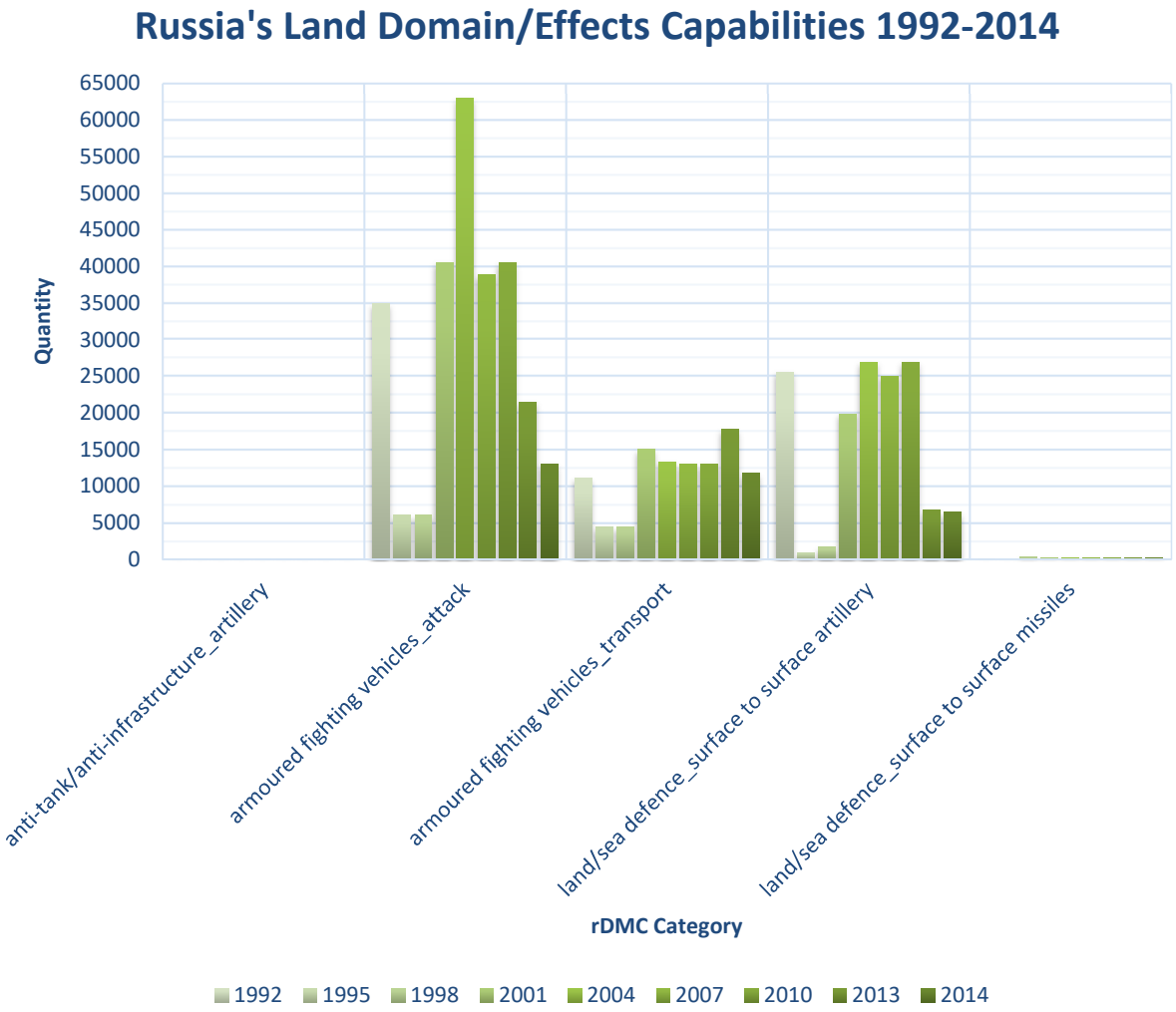

Figure 10: Russia's land domain/effects capabilities 1992-2014, triennially compiled data plus 2014[838] *[own illustration]*

As in the air domain in subchapter 4.3.3.2, the land domain/effects capabilities do also show irregularities in the dataset, which can be observed especially in the three categories with sufficient information (armoured fighting vehicles_attack, armoured fighting vehicles_transport, and land/sea defence_surface to surface artillery). For example, across the three categories, there is missing data in the years 1995 and 1998. In addition, the sudden rise and fall in armoured fighting vehicles_attack from 40.000 (2001) over 60.000 (2004) to 38.000 (2007) indicates the existence of a data artefact. Again, just like for the air domain, land domain/effects capabilities categories should be evaluated with great caution.

[838] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
anti-tank/anti-infrastructure_artillery	**NA**	NA	NA	**NA**	NA	NA	**NA**	NA	NA
armoured fighting vehicles_attack	**0,69:1**	0,16:1	0,17:1	**0,99:1**	1,45:1	1,02:1	**1,13:1**	0,84:1	0,53:1
armoured fighting vehicles_transport	**0,18:1**	0,08:1	0,1:1	**0,34:1**	0,26:1	0,25:1	**0,26:1**	0,31:1	0,2:1
land/sea defence_surface to surface artillery	**0,67:1**	0,03:1	0,07:1	**0,68:1**	0,84:1	0,84:1	**0,97:1**	0,3:1	0,29:1
land/sea defence_surface to surface missiles	**0:1**	NA	0,13:1	**0,02:1**	0,02:1	0,02:1	**0,02:1**	0,34:1	0,35:1

Table 43: Russia:NATO Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[839]

Based on Table 42 the following patterns were identified: In the initial post-cold War era, and on the basis of the rDMC's dataset, Russia had not been 'capable' in any of the four categories with available data from the land domain/effects capabilities vis-à-vis NATO's total capabilities. After the first decade of the post-Cold War era, the situation improved in the armoured fighting vehicles_attack category, wherein Russia became 'partially credible'.

After the second decade of the post-Cold War era, Russia became clearly 'capable in the category armoured fighting vehicles_attack and 'partially capable' in the land/sea defence_surface to surface artillery.

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
anti-tank/anti-infrastructure_artillery	**NA**	NA	NA	**NA**	NA	NA	**NA**	NA	NA
armoured fighting vehicles_attack	**1,31:1**	0,36:1	0,31:1	**1,67:1**	2,41:1	1,76:1	**1,85:1**	1,27:1	0,82:1
armoured fighting vehicles_transport	**0,27:1**	0,15:1	0,18:1	**0,55:1**	0,38:1	0,39:1	**0,46:1**	0,71:1	0,51:1
land/sea defence_surface to surface artillery	**1,03:1**	0,04:1	0,1:1	**0,95:1**	1,13:1	1,14:1	**1,38:1**	0,48:1	0,44:1
land/sea defence_surface to surface missiles	**0,16:1**	NA	1,82:1	**1,17:1**	0,71:1	0,12:1	**0,66:1**	1,29:1	1,18:1

Table 44: Russia:NATO-Europe Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[840] *[own description]*

[839] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

[840] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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In initial post-Cold War era, Russia's capability comparison to NATO-Europe was comparatively more advantageous for Russia, but still limited. Back in 1992, Russia had been 'capable' in two of four categories (armoured fighting vehicles_attack and land/sea defence_surface to surface artillery) (see Table 44).

After the first decade of the post-Cold War era, Russia remained 'capable' in armoured fighting vehicles_attack, decreased to 'partially capable' in land/sea defence_surface to surface artillery, but became 'capable' in land/sea defence_surface to surface missiles.

Lastly, after the second decade of the post-Cold War era, Russia remained 'capable' in armoured fighting vehicles_attack, became 'capable' in land/sea defence_surface to surface artillery again, while the country became 'incapable' in land/sea defence_surface to surface missiles.

Given the fluctuation in the trends across almost all of the four categories with quantities, a look at the capability ratios from 1995 and 1998 as well as 2004 and 2007 showed such fluctuations that could be explained by missing data or data errors in the raw dataset of the IISS MB as well as potential erroneous transformation of the data into the rDMC categories.

As a consequence, a look at the alternative datasets is strongly warranted, which is therefore provided in Table 45.

	2022 Statista based on Global Firepower and SIPRI			*2022 NATO Projected Global Firepower*		
	NATO	*Russia*	*Russia:NATO*	*NATO*	*Russia*	*Russia:NATO*
Main battle tanks	14.682	12.420	0,85:1	1.515	9.315	6,15:1
Armoured vehicles	115.855	30.122	0,26:1	11.653	22.592	1,94:1
Self-propelled artillery	5.040	6.574	1,3:1	504	4.931	9,78:1
Towed artillery	5.495	7.571	1,38:1	578	5.678	9,82:1
Self-propelled rocket launchers	2.803	3.391	1,21:1	292	2.543	8,71:1

Table 45: Alternate datasets for a Russia:NATO comparison per land domain capability, reference year: 2022[841] *[own description]*

[841] Compare: Statista (2022): Comparison of the military capabilities of NATO and Russia as of 2022, Hyperlink: https://www.statista.com/statistics/1293174/nato-russia-military-comparison/ (Last visit: 25.01.2023); with: GFP (2022): 2022 NATO Projected Global Firepower, Hyperlink: https://www.globalfirepower.com/nato-projected-firepower.php (Last visit: 25.01.2023).

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In order to understand the relationship between the different categories of the alternative dataset versus the rDMC dataset categories, the linkages are herewith provided:

Main battle tanks belong to the armoured fighting vehicles_attack category. They are the classical heavy armoured attack vehicles with a large-calibre main cannon as effector against other tanks, vehicles, or infrastructure.

Armoured vehicles can belong to the armoured fighting vehicles_attack, if they are heavily armoured and used as combat support for the mechanised infantry. If the vehicles are just armed with limited effectors, they might also classify as armoured fighting vehicles_transport.

Then, there are self-propelled artillery and towed artillery that both belong to the land/sea defence_surface to surface artillery. Other than these original rDMC categories, in the two military equipment groups from the alternate datasets, there are no maritime assets added to the quantity, which represents a considerable advantage for adequately addressing land domain categories only.

Lastly, self-propelled rocket launchers belong to the land/sea defence_surface to surface missiles category, while there is also no maritime equipment included in that alternative dataset. Thus, the three last alternative dataset categories that cover the indirect fires capabilities encompass only land-based assets.

By comparing the ratio results of the rDMC dataset with the 2022 Statista dataset, Russia could be identified as being ‘capable’ in three of the five categories. In contrast, the 2022 NATO Projected Global Firepower dataset provides an overwhelming dominance of Russia in practically all five categories. The smallest difference between Russia’s and NATO’s forces exists between the stock of armoured vehicles, while Russia is still attributed the double amount of NATO’s stock.

Overall, there is sufficient information from the rDMC dataset as well as the two alternative datasets that suggest Russia’s land domain/effects capabilities to be selectively ‘capable’. Russia’s holdings in main battle tanks (including older types from the Soviet Union) as well as considerable quantities in different types of artillery reflect a continuously strong influence of the Soviet military strategy based on massive (indirect and direct) firepower. The results, while not as conclusive as desired due to the fluctuations in the data, pose sufficient credibility of Russia in the land domain capabilities (excluding the sea-based effects capabilities that could not be validated).

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4.3.3.4 Land close air support domain capabilities

In the scope of this subchapter, the term 'land close air support' covers all kinds of helicopters (*also known as* rotary-wing aircraft) from attack helicopters over various variants of transport helicopters to general utility helicopters.

In the Russian military, the predominant branch that flies those types of aircraft belongs to the Russian Aerospace Forces (VKS). While helicopters are naturally air domain-related, they could have been covered in subchapter 4.3.3.2, but in accordance with the Russian operational doctrine which uses especially armed helicopters as close air support for land domain operations, but also as "major force multipliers during Russian joint operations" (Myers), helicopters deserved an individual subchapter.[842]

While the armed land close air support through attack helicopters in an offensive or defensive operation is quickly understood, the relevance of transport helicopters for Russia should not be underestimated. Russia is a thinly populated but geographically vast country with minimal infrastructure in certain regions of the country. Thus, if military action is required, transport helicopters represent one way of rapid force deployment.[843] Furthermore, if Russia becomes active in an inter-state conflict, Russia's highly trained elite airborne and especially air assault (i.e., helicopter-transported) troops (*Vozdushno-desantnye voyska / VDV*) would quickly be deployed.[844]

Taking the value of helicopters for a modern military into account, open-source information found by De Haas showed that Russia was considering a procurement package for the timeframe 2011-2020 which entailed the purchase of around 1.000 helicopters, ranging from attack over transport to utility helicopters.[845] In accordance with the IISS analysis of the 2008 'New Look' programme, some modernisation in connection with two specific types, namely the Mi-28N Havoc and the Ka-52 Hokum, were also foreseen.[846]

[842] Myers, N. (2018): The Russian Aerospace Force, p. 94 and pp. 96 f.
[843] Myers, N. (2018): The Russian Aerospace Force, p. 94.
[844] US Congressional Research Service (2020): Russian Armed Forces: Capabilities, p. 2, Hyperlink: https://sgp.fas.org/crs/row/IF11589.pdf (Last visit: 22.01.2023).
[845] De Haas, M. (2011): Russia's Military Reforms: Victory after Twenty Years of Failure?, pp. 22 f., Hyperlink: https://www.clingendael.org/sites/default/files/pdfs/20111129_clingendaelpaper_mdehaas.pdf (Last visit: 11.02.2023).
[846] IISS (2022): If New Looks could kill: Russia's military capability in 2022, Hyperlink: https://www.iiss.org/blogs/military-balance/2022/02/if-new-looks-could-kill-russias-military-capability-in-2022 (Last visit: 23.01.2023).

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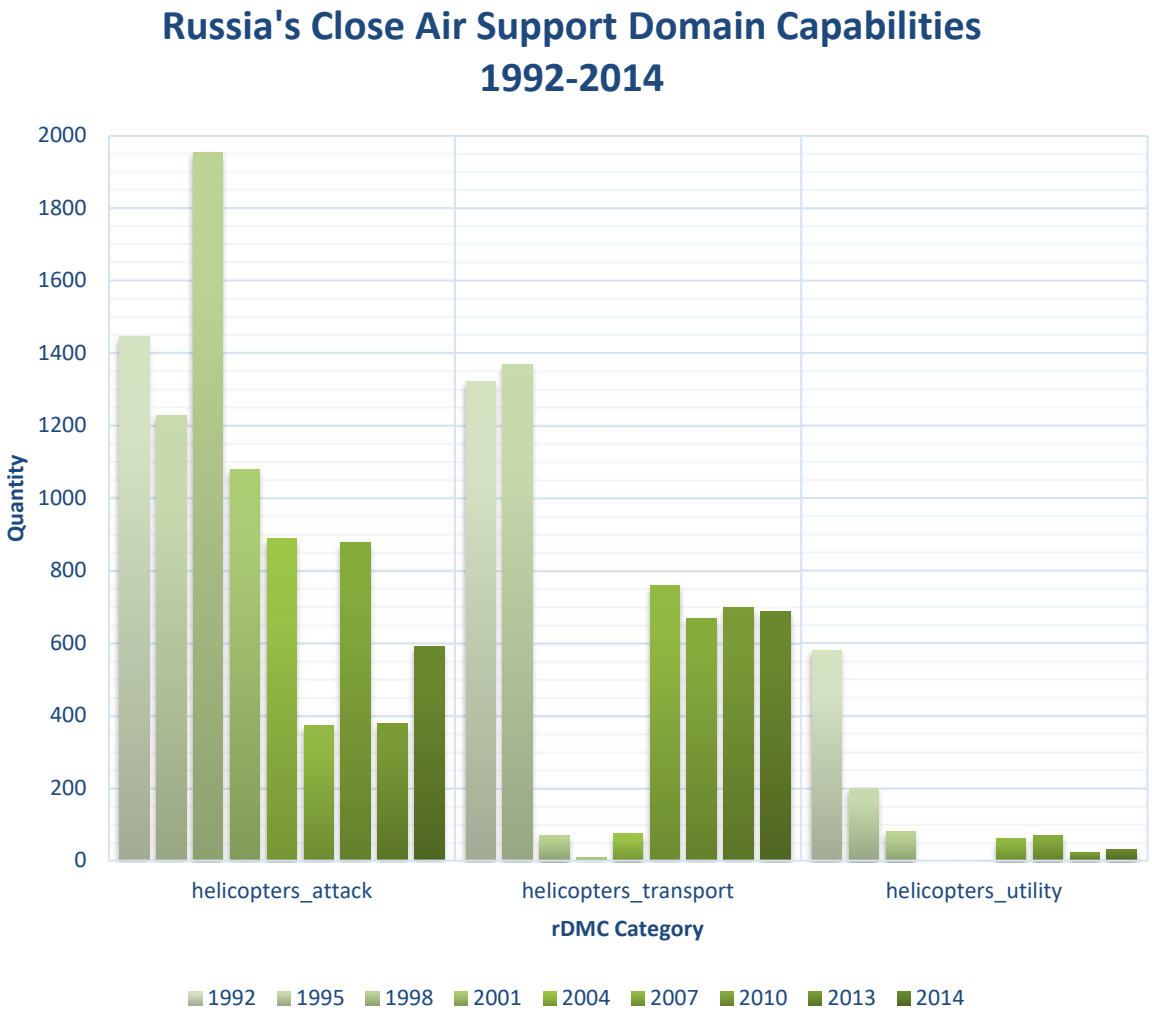

Figure 11: Russia's land close air support domain capabilities 1992-2014, triennially compiled data plus 2014[847] *[own illustration]*

Three types of rotary-wing aircraft are selected for a review of Russia's capabilities in the land close air support domain. Just as in the previous subchapter 4.3.3.2 and 4.3.3.3, the pattern in Russia's holdings is marked by considerable 'jumps' that should not happen in that extent as seen in Figure 11. Obvious statistical outliers can be discovered for the helicopters_attack in the year 1998 or helicopters_transport in the year 2001. Overall, the rDMC dataset offers considerable gaps in the actual holdings throughout the dataset.

In the initial post-Cold War era, Russia had only been 'capable' in the domain of helicopters_transport, while it became completely 'incapable' in all land close air support domain capabilities throughout the timeframes after the first and second decade of the post-

[847] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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Cold War era (see Table 46). From a quick look in the raw data of Russia's stock of transport helicopters, the rDMC provided on the basis of the IISS MB, the necessary data to ensure a reliable analysis is often not available.

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
helicopters_attack	**0,33:1**	0,39:1	0,63:1	**0,37:1**	0,31:1	0,16:1	**0,52:1**	0,28:1	0,47:1
helicopters_transport	**1,47:1**	1,56:1	0,13:1	**0,01:1**	0,09:1	0,69:1	**0,43:1**	0,13:1	0,13:1
helicopters_utility	**0,07:1**	0,03:1	0,01:1	**NA**	NA	0,01:1	**0,01:1**	0,01:1	0,02:1

Table 46: Russia:NATO Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[848] [own calculation]

Despite the limitations of the rDMC dataset, the comparison between Russia and NATO-Europe resulted in a different output (see Table 47).

In the initial post-Cold War era, Russia had been clearly 'capable' in two of three land close air support categories (helicopters_attack and helicopters_transport). In the first and second decade of the post-Cold War era, however, Russia was able to retain only one 'capable' category (helicopters_attack).

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
helicopters_attack	**2,14:1**	1,11:1	1,82:1	**1,09:1**	0,89:1	0,4:1	**1,9:1**	0,79:1	1,69:1
helicopters_transport	**2,03:1**	2,05:1	0,17:1	**0,02:1**	0,15:1	1,5:1	**0,61:1**	0,36:1	0,37:1
helicopters_utility	**0,21:1**	0,11:1	0,05:1	**NA**	NA	0,03:1	**0,04:1**	0,02:1	0,03:1

Table 47: Russia:NATO-Europe Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[849] [own calculation]

In view of the data issues with the rDMC dataset, the 2022 Statista and 2022 NATO Projected Global Firepower deliver a much clearer, *albeit* more ambivalent situational picture (see Table 48).

Before continuing the analysis, a caveat has to be set. The alternative datasets only provide a sum of all helicopters and a subtotal for the Attack Helicopters, which means that quantity relations for Transport and Utility rotary-wing aircraft cannot be distinguished in the total numbers of helicopters.

In addition, there is no clear definition available whether a certain armed type of helicopter is considered a utility helicopter or an attack helicopter. Definitions in military equipment can be fluid as the example of the land- and sea-based surface-to-surface weaponry have shown.

[848] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

[849] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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	2022 Statista based on Global Firepower and SIPRI			*2022 NATO Projected Global Firepower*		
	NATO	*Russia*	*Russia:NATO*	*NATO*	*Russia*	*Russia:NATO*
Total helicopters	8.485	1.543	0,18:1	848	1.157	1,36:1
Attack Helicopters	1.359	544	0,4:1	136	416	3,06:1

Table 48: Alternate datasets for a Russia:NATO comparison per land close air support domain capability, reference year: 2022[850] *[own calculation]*

The 2022 Statista confirms the dire picture for Russia's 'incapable' rotary-wing aircraft, while the 2022 NATO Projected Global Firepower confutes the claim that Russia's helicopter forces are incapable. As in the previous subchapters, NATO relies on its member states' commitments to provide their nationally owned land close air support capabilities to the transatlantic alliance in order to outnumber Russia's military.

4.3.3.5 Maritime domain capabilities

Russia's navy looks upon a long history dating back to times of *Tsar* Peter the Great. While Russian strategic military thinking is dominated by a land focus, which is not surprising in view of the vast geography of the country that is stretched through 11 official time zones, the navy represented nevertheless an important cornerstone for the country. While the days of the navy as 'connector' to the Western world under Imperial Russia have been long gone, the navy has nowadays the task to project military power, including the nuclear deterrence of adversaries, and enable the voicing of political interests in adjacent maritime areas of the Russian Federation.[851]

The Navy of the Russian Federation provides a diverse set of military capabilities to the Kremlin. Naturally, this branch of the military offers a wide range of surface ships and submarines. Despite the maritime focus, Russia's navy has also been equipped with naval aviation on its single aircraft carrier *Admiral Kuznetsov* and land-based aircraft with a naval operations tasking. Furthermore, the navy also includes so-called Coastal Troops that deliver indirect fire support as well as air defence from land, but for the maritime assets of Russia.

[850] Compare: Statista (2022): Comparison of the military capabilities of NATO and Russia as of 2022, Hyperlink: https://www.statista.com/statistics/1293174/nato-russia-military-comparison/ (Last visit: 25.01.2023); with: GFP (2022): 2022 NATO Projected Global Firepower, Hyperlink: https://www.globalfirepower.com/nato-projected-firepower.php (Last visit: 25.01.2023).

[851] Tsypkin, M. (2010): Chapter 6 – The Challenge of Understanding the Russian Navy, pp. 331-335. In: *Blank, S./Weitz, R. (eds.): The Russian Military Today and Tomorrow: Essays in Memory of Mary Fitzgerald, Hyperlink: https://apps.dtic.mil/sti/pdfs/ADA525166.pdf (Last visit: 12.02.2023).*

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Integral part of these Coastal Troops are also amphibious and air assault formations and equipment.[852]

The navy's military fleet structure reflects its areas of operation. Currently, there are four fleets and one flotilla at the Kremlin's disposal to project its military power and political interests abroad. The most relevant naval forces for the Euro-Atlantic region are located within the Northern Fleet that covers the North Atlantic and the Arctic region, and the fleets in the Black Sea and Baltic Sea. The strategic nuclear deterrent in the form of nuclear-powered submarines with nuclear-tipped submarine-launched ballistic missiles (SLBMs) belong to both oceanic fleets (Atlantic and Pacific). According to the U.S. Congressional Research Service, each of the four Russian navy fleet commands have been attributed at least one brigade[853] of elite naval infantry for rapid reaction operations.[854]

In regard to the military reforms that Russia conducted throughout the post-Cold War era, Tsypkin argued that there was no major impact on the navy noticeable until the 2008 'New Look'. While the Russian navy had suffered neglect by the Kremlin under Yeltsin and early Putin years (the most notable accident had been the sinking of the submarine *Kursk* in August 2000), few new vessels were laid on keel and new naval missiles (especially for the strategic nuclear deterrent) developed.[855]

Since the 2008 Russo-Georgian War and the launch of the 'New Look' modernisation programme in the same year, the Russian navy has undergone considerable transformation in both ships and ship-based cruise missiles for sea and land attacks. While the navy's main power projection throughout the world oceans still rests on the Soviet legacy equipment, naval capabilities for maritime regions closer to Russia were considerably modernised or even newly developed and deployed. With the 2014 Russian annexation of Crimea, the navy's Black Sea fleet was considerably strengthened due to the reinforcement of the fleet's headquarters in Sevastopol.[856]

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[852] For an overview of Russia' navy and its individual parts, see: Ministry of Defence of the Russian Federation (n.a.): Navy - Structure, Hyperlink: https://eng.mil.ru/en/structure/forces/navy/structure.htm (Last visit: 12.02.2023).

[853] The personnel count between the U.S. Congressional Service and GlobalSecurity regarding the size of the brigade vary in this case. Compare: V. Military force structure in the Appendices; and: US Congressional Research Service (2020): Russian Armed Forces: Capabilities, p. 2, Hyperlink: https://sgp.fas.org/crs/row/IF11589.pdf (Last visit: 22.01.2023).

[854] US Congressional Research Service (2020): Russian Armed Forces: Capabilities, p. 2, Hyperlink: https://sgp.fas.org/crs/row/IF11589.pdf (Last visit: 22.01.2023).

[855] Tsypkin, M. (2010): Chapter 6 – The Challenge of Understanding the Russian Navy, pp. 341-352. In: *Blank, S./Weitz, R. (eds.): The Russian Military Today and Tomorrow: Essays in Memory of Mary Fitzgerald, Hyperlink: https://apps.dtic.mil/sti/pdfs/ADA525166.pdf (Last visit: 12.02.2023).*

[856] IISS (2022): If New Looks could kill: Russia's military capability in 2022, Hyperlink: https://www.iiss.org/blogs/military-balance/2022/02/if-new-looks-could-kill-russias-military-capability-in-2022 (Last visit: 23.01.2023).

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In accordance with information extracted by the De Haas from the Russian military procurement programme 2011-2020, Russia had decided to bolster its navy by buying 20 new conventional submarines and up to 100 surface vessels that include Frigates and Corvettes.[857] Furthermore, Russia also wanted procure four amphibious assault helicopter carriers from France, of which two were to be built in France and two in Russia. This deal was cancelled after Russia begun to conduct its proxy aggression in Eastern Ukraine since 2014.[858]

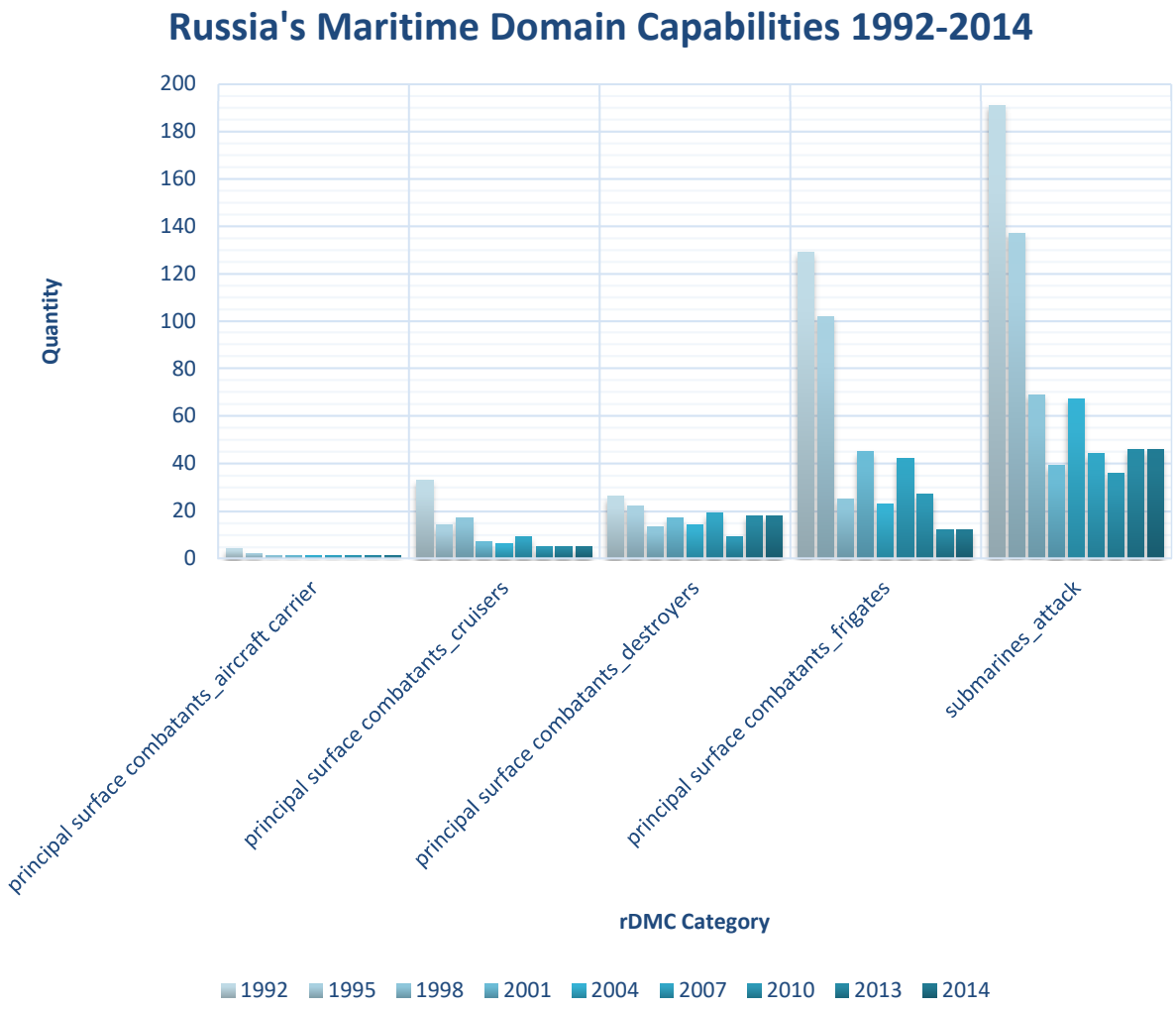

Figure 12: Russia's maritime domain capabilities 1992-2014, triennially compiled data plus 2014[859] *[own illustration]*

[857] De Haas, M. (2011): Russia's Military Reforms: Victory after Twenty Years of Failure?, pp. 22 f., Hyperlink: https://www.clingendael.org/sites/default/files/pdfs/20111129_clingendaelpaper_mdehaas.pdf (Last visit: 11.02.2023).
[858] BBC (2015): Mistral warships: Russia and France agree compensation deal, Hyperlink: https://www.bbc.com/news/world-europe-33798102 (Last visit: 12.02.2023).
[859] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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In regard to the rDMC dataset, the maritime domain has been one of the easiest to compile thanks to the clearcut equipment-oriented categories that encompass the additional identifier of 'principal surface combatants'. In essence, the overview in Figure 12 contains all four categories of principal surface combatants as well as submarines_attack, which enable the projection of Russia's politico-military power at sea as well as offensive and defensive operational capabilities against maritime and land-based targets.

Given the much smaller numbers of the Russian navy in comparison to some of the other previous domain overviews (especially the land domain/effects capabilities), there is less variation. Nevertheless, fluctuations can still be detected, such as the lower quantity of submarines_attack in the year 2001 (compared to the years 1998 and 2004), as well as for principal surface combatants_frigates in the years 1998 and 2004 (compared to the years 2001 and 2007). So again, the following calculations based on the rDMC dataset should be used with caution.

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
principal surface combatants_aircraft carrier	**0,25:1**	0,12:1	0,06:1	**0,06:1**	0,06:1	0,05:1	**0,06:1**	0,07:1	0,07:1
principal surface combatants_cruisers	**0,67:1**	0,42:1	0,57:1	**0,25:1**	0,21:1	0,41:1	**0,23:1**	0,23:1	0,23:1
principal surface combatants_destroyers	**0,33:1**	0,27:1	0,13:1	**0,19:1**	0,15:1	0,21:1	**0,09:1**	0,15:1	0,16:1
principal surface combatants_frigates	**0,52:1**	0,44:1	0,11:1	**0,23:1**	0,13:1	0,24:1	**0,17:1**	0,08:1	0,09:1
submarines_attack	**0,97:1**	0,74:1	0,46:1	**0,29:1**	0,5:1	0,32:1	**0,26:1**	0,37:1	0,36:1

RUS dom. = Russia is dominant in that capability/no comparable NATO capability

Table 49: Russia:NATO Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[860]

In the initial post-Cold War era, Russia had been 'partially capable' in the domain of submarines_attack (see Table 49). Furthermore, Russia's navy was neither able to sustain that capability nor to establish any new full or partial capability. Instead, regarding the Russian naval performance throughout the timeframe of the first and second decade of the post-Cold War era, the ratios for all five categories under examination decreased to the disadvantage of Russia. In view of the the combined NATO naval power that includes not only the U.S., which has to rely on a strong navy to connect with its European allies, but also the former colonial

[860] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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powers of France and the UK, the divide between Russia's navy capabilities and NATO's maritime capabilities is not surprising.

	1992	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
principal surface combatants_aircraft carrier	**1:1**	0,4:1	0,2:1	**0,2:1**	0,17:1	0,14:1	**0,17:1**	0,33:1	0,33:1
principal surface combatants_cruisers	**33:1**	14:1	17:1	**7:1**	6:1	RUS dom.	**RUS dom.**	RUS dom.	RUS dom.
principal surface combatants_destroyers	**0,9:1**	0,71:1	0,31:1	**0,52:1**	0,33:1	0,5:1	**0,21:1**	0,34:1	0,38:1
principal surface combatants_frigates	**0,83:1**	0,6:1	0,15:1	**0,31:1**	0,18:1	0,31:1	**0,24:1**	0,11:1	0,12:1
submarines_attack	**1,8:1**	1,36:1	0,84:1	**0,5:1**	0,87:1	0,59:1	**0,47:1**	0,72:1	0,71:1

RUS dom. = Russia is dominant in that capability/no comparable NATO capability

Table 50: Russia:NATO-Europe Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014 [own calculation]

When the North American contributions are taken out of the calculation, Russia's navy performs quite competitively (see Table 50).

In the initial post-Cold War era, Russia is 'capable' in the categories of principal surface combatants_aircraft carrier, principal surface combatants_cruisers, and submarines_attack, while it is at least 'partially capable' in principal surface combatants_destroyers.

After the first decade of the post-Cold War era, Russia's capabilities have lost their advantage vis-à-vis the European NATO member states, which cannot be explained by NATO's enlargement, because two of the three new NATO member states are landlocked (Czech Republic and Hungary). Following the second decade of the post-Cold War era, the results did not deviate from the one's a decade before: Russia remained 'capable' in the field of principal surface combatants_cruisers only.

The two alternative datasets provide information that can be easily matched with the categories of the rDMC and are hereby provided in Table 51 as benchmarks for the results of the previous analysis in Table 49.

The first alternative category stand for itself, because it provides a full account of all maritime ships and vessels of NATO and Russia. Furthermore, the Aircraft carriers, Destroyers, and Frigates can be matched with their respective 'mirror' rDMC categories. Corvettes are not considered 'principal surface combatants' in the rDMC, but (1) if used in such a combatant role, this category provides important information, and (2) since the definition of each type of vessels often depends on the tonnage, different datasets might use different thresholds to classify those vessels accordingly. Since this information is not provided by Statista or the Global Firepower

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data, it cannot be said if the rDMC and alternative dataset categories fully match with each other.

This might also be a reason why the rDMC category principal surface combatants_cruisers is not part of the alternative datasets' categories. Depending on the criteria of tonnage, these ships might be counted as destroyers instead.

Submarines also offer a similar challenge, since the rDMC relates to submarines_attack as a single category (while the rDMC also employs further categories, e.g., for submarines equipped with ballistic missiles). Just as for the corvettes (or the other types of ships), it cannot be excluded that the submarines data includes more than attack submarines.

Lastly, the alternative datasets also provide a separate entry for Helicopter carriers, which are basically included in the rDMC category principal surface combatants_aircraft carrier.

	2022 Statista based on Global Firepower and SIPRI			*2022 NATO Projected Global Firepower*		
	NATO	*Russia*	*Russia:NATO*	*NATO*	*Russia*	*Russia:NATO*
Total naval assets	2.049	605	0,3:1	204	454	2,23:1
Aircraft carriers	17	1	0,06:1	3	1	0,33:1
Helicopter carriers	-	-	-	2	0	0:1
Destroyers	112	15	0,13:1	12	11	0,92:1
Frigates	135	11	0,08:1	14	8	0,57:1
Corvettes	56	86	1,54:1	9	65	7,22:1
Submarines	144	70	0,49:1	22	53	2,41:1

Table 51: Alternate datasets for a Russia:NATO comparison per maritime domain capability, reference year: 2022[861]

Basically, the 2022 Statista dataset supports the rDMC maritime domain analysis insofar as all capabilities that are examined are described as 'incapable'. Since the corvettes are not part of the rDMC, Russia's 'capable' maritime force in that type of vessel is noteworthy but not a gamechanger as such. Taking the 2022 NATO Projected Global Firepower dataset into account, Russia employs a 'capable' total number of ships and is furthermore 'capable' in corvettes and submarines', while 'partially capable' in destroyers.

From a maritime operational perspective, Russia could play a strong maritime card if NATO's member states, i.e., those that are naval powers, do not contribute adequately to NATO's maritime force posture.

[861] Compare: Statista (2022): Comparison of the military capabilities of NATO and Russia as of 2022, Hyperlink: https://www.statista.com/statistics/1293174/nato-russia-military-comparison/ (Last visit: 25.01.2023); with: GFP (2022): 2022 NATO Projected Global Firepower, Hyperlink: https://www.globalfirepower.com/nato-projected-firepower.php (Last visit: 25.01.2023).

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4.3.3.6 Nuclear domain capabilities

Russia's post-Cold War era politico-strategic thinking regarding the role of nuclear weapons in foreign, security and defence policy exhibits no small amount of continuity to its predecessor, the Soviet Union. For the Kremlin, the existence of a nuclear arsenal provides four positive effects. Nuclear weapons

(1) ensure the the political sovereignty of the Russian Federation from direct military aggression on Russia's territory, because an attacker might face comprehensive destruction of its own forces as well as vulnerability to nuclear retaliation by Russia (deterrence effect),
(2) provide the Kremlin with an instrument that can be used for coercing other states in giving in to Russian demands (political effect),
(3) enable negotiations with the U.S. as the sole remaining global superpower on an equal footing, because Russia owns the largest stockpile world-wide (strategic balance effect), and
(4) provide Russia with the opportunity to compensate for the lack of adequate quantities and qualities of its conventional forces in a conflict scenario (warfighting effect).[862]

In practical terms, Russia's strategic nuclear deterrent follows the classical doctrinal approach of the nuclear triad with a land-based, sea-based, and air-based leg.

The land-based intercontinental ballistic missiles (ICBMs) are maintained, controlled and launched by the Russian Strategic Rocket Forces (SRF). The sea-based leg consists of the submarine-launched ballistic missiles (SLBMs) carried by the Russian navy's nuclear-powered ballistic missile submarines. Lastly, the air-based leg is represented by the strategic bomber fleet of the Russian Aerospace Forces that carry and launch nuclear-tipped air-launched cruise missiles.[863]

While the Russian nuclear arsenal employs a large quantity of warheads and delivery systems, it has never been again at the excessive height of the Soviet nuclear posture in the decades of the Cold War.[864] One can get a glimpse of the days of the Soviet Union's massive nuclear armament programmes by looking at the 1991 START I Treaty's listing of nuclear warheads for the Soviet Union. When compared with the list of Russian warheads in accordance with the

[862] Loukianova Fink, A./Oliker, O. (2020): Russia's Nuclear Weapons in a Multipolar World, pp. 37-45.
[863] US Congressional Research Service (2022): Russia's Nuclear Weapons: Doctrine, Forces, and Modernization, pp. 16-20, Hyperlink: https://sgp.fas.org/crs/nuke/R45861.pdf (Last visit: 12.02.2023).
[864] US Congressional Research Service (2022): Russia's Nuclear Weapons: Doctrine, Forces, and Modernization, pp. 11-14, Hyperlink: https://sgp.fas.org/crs/nuke/R45861.pdf (Last visit: 12.02.2023).

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2010 New START Treaty's listing, some warheads of the Soviet era were still in use, while very few were new or modernised and a few put out of service due to obsolescence reasons.

Missiles/Launcher systems	*1991 START I*	*2010 New START*
ICBM (fixed)	RS-10 RS-12 RS-16 RS-18 RS-20	RS-18 RS-20 RS-24
ICBM (mobile)	RS-22 RS-12M	RS-12M, RS-12M2
SLBM	RSM-25 RSM-40 RSM-50 RSM-52 RSM-54	RSM-50 RSM-52 RSM-54 RSM-56
Heavy bombers	Tu-95 Tu-160	Tu-95MS Tu-160
Heavy bomber armaments	AS-15A AS-15B	*Not indicated*

Table 52: Russia's Strategic Nuclear Triad comparison 1991-2010, derived from the 1991 START I and 2010 New START treaties

In order to focus the examination of Russia's capabilities in the strategic nuclear domain, the focus is put on the active strategic nuclear weapons from the 2010 New START Treaty. For the heavy bomber armaments, the two ALCMs mentioned in the 1991 START I Treaty are just carried over for a further analysis of the air-leg of the nuclear triad.

Starting with the land-based fixed ICBM types, the RS-18 *also known as* UR-100 (NATO code: SS-19 "Stiletto") is probably the oldest ICBM system active in Russia's silo-based nuclear arsenal, since it was already deployed in 1980. The latest variant 'Mod-3' has a range of 10.000 km and carries six MIRV warheads, each with a yield of 500-700 kiloton TNT equivalent. As of 2016, 20 RS-18 have remained in active service.[865] By 2022, Russia still makes efficient use of this outdated missile in conjunction with the prototype testing of the new Avangard hypersonic glide vehicle.

The second of the three land-based ICBMs is the RS-20 *also known as* R-36 (NATO code: SS-18 "Satan") in its variant 'Mod-6'. It has been the most powerful ICBM platform in use by the Russian Federation in the examination period 1992-2016. The missile was first deployed in 1988, has a range of 11.000 km and can carry up to 10 MIRV warheads with a yield of 500-700 kiloton TNT equivalent per warhead. Furthermore, in in order improve its chances to hit the intended target, the missile can be equipped with a wide range of add-ons, such as decoys

[865] Missile Threat (2021): UR-100 (SS-19), Hyperlink: https://missilethreat.csis.org/missile/ss-19/ (Last visit: 23.01.2023).

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penetration aids, re-targeting or radiation shielding. As of 2016, 46 RS-20 missiles have been active.[866]

The third of the three land-based ICBMs is the RS-24 *also known as* RS-24 Yars (NATO code: SS-27 Mod 2). It was tested in a mobile configuration at first, but became eventually silo-based. This missile has a range of 10.500 km and carries three MIRV warheads with an individual yield of 150-200 kiloton TNT equivalent. It entered service in 2010.[867]

In addition to the fixed ICBM systems that are usually sheltered in hardened underground launch tubes, the RS-12M *also known as* RT-2PM Topol (NATO code: SS-25 "Sickle") is a road-mobile ICBM with a single warhead with a yield of 550-800 kiloton TNT equivalent, which was deployed for the first time in 1988. As of 2016, Russia owned 90 RS-12M launchers, which were intended to be replaced with its successor Topol-M till 2022.[868]

As additional mobile ICBM, the RS-12M2 *also known as* RT-2PM2 Topol-M (NATO code: SS-27 Mod 1 "Sickle B") is an upgraded version of the previously introduced Topol. This more advanced missile variant entered service in 1997 and is equipped with a single warhead of a yield of 500 kiloton TNT equivalent. In 2016, the Topol-M's deployment encompassed 18 road-mobile missiles and 60 in silos.[869]

In the sea-based domain of SLBMs, the RSM-50 *also known as* R-29 Vysota (NATO code: SS-N-18 "Stingray") enables Russia's submarines to strike at targets with a range of 6.500 km with a payload of three MIRV warheads, each having a yield of 200 kiloton TNT equivalent. The SLBM are deployed on Delta III class submarines. Based on a 2013 U.S. report, 96 RSM-50 were active in Russia's naval assets, assumably on a total of four Delta III submarines (from an original count of 14 in 1991).[870]

The RSM-52 *also known as* R-39 (NATO code: SS-N-20 "Sturgeon") was introduced in 1984 and is based on Typhoon-class submarines. The missile has a range of 8.300 km and a payload of ten MIRV warheads each with a yield of 100 kiloton TNT equivalent.[871] Russia eliminated

[866] Missile Threat (2021): R-36 (SS-18 "Satan"), Hyperlink: https://missilethreat.csis.org/missile/ss-18/ (Last visit: 27.12.2022)
[867] Missile Threat (2021): RS-24 Yars (SS-27 Mod 2), Hyperlink: https://missilethreat.csis.org/missile/rs-24/ (Last visit: 23.01.2023).
[868] Missile Threat (2021): RT-2PM Topol (SS-25), Hyperlink: https://missilethreat.csis.org/missile/ss-25/ (Last visit: 23.01.2023).
[869] Missile Threat (2021): RT-2PM2 Topol-M (SS-27 Mod 1 "Sickle B"), Hyperlink: https://missilethreat.csis.org/missile/ss-27/ (Last visit: 23.01.2023).
[870] Missile Threat (2022): R-29 Vysota (SS-N-18), Hyperlink: https://missilethreat.csis.org/missile/ss-n-18/ (Last visit: 23.01.2023).
[871] Missilery.info (n.a.): R-39 submarine ballistic missile (RSM-52), Hyperlink: https://en.missilery.info/missile/r39 (Last visit: 22.01.2023).

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the full arsenal of RSM-52 in 2012 within the remit of U.S.-Russian bilateral nuclear disarmament efforts.[872]

The RSM-54 *also known as* R-29RM Shtil (NATO code: SS-N-23 "Skiff") was introduced in 1986 for deployment on Delta IV submarines. The missile offers a range of 8.300 km and, while technically able to carry up to ten MIRV warheads, it was produced to be equipped with four MIRV warheads only. Each of the warheads has a yield of 100 kiloton TNT equivalent. U.S. reporting from 2013 indicated a total of 96 active missiles of this type.[873]

Lastly, the RSM-56 *also known as* RSM-56 Bulava (NATO code: SS-N-32) is the newest missile type in the Russian navy's strategic nuclear arsenal. Its first deployment occurred in 2013 on the first Borey-class submarine, which was attributed to the Northern Fleet for the Euro-Atlantic region. The missile has the common range for Russian SLBMs, namely 8.300 km. The payload includes ten MIRV warheads with 100-150 kiloton TNT equivalent a piece. As of November 2015, only two Borey-class submarines were operational (the second one is attributed to the Pacific Fleet).[874]

The final leg of Russia's nuclear triad consists of the Russian Aerospace Forces' heavy bombers Tu-95MS (NATO code: "Bear") and Tu-160 (NATO code: "Blackjack").

The MS variant of the Tu-95 saw first deployment in 1979. This turboprop aircraft has a flight range of 10.500 km, while a fully loaded plane's range is limited to 6.500 km. The CSIS Missile Defense Project reported that Russia operated 32 Tu-95MS6 with six Kh-55 ALCM a piece, and 31 Tu-95MS16, each carrying 16 Kh-55 ALCM.[875]

The Tu-160 Blackjack is Russia's supersonic strategic bomber that entered service in 1987. The aircraft is propelled by jet engines and has a general flight range of 12.300 km, while the combat radius is estimated at 7.300 km. The CSIS Missile Defense Project identified 13 active Tu-160 that can individually carry 12 Kh-55.[876]

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[872] Kyiv Post (2012): Russia and U.S. eliminate entire class of ballistic missiles, Hyperlink: https://www.kyivpost.com/article/content/ukraine-politics/russia-and-us-eliminate-entire-class-of-ballistic-missiles-2-312993.html (Last visit: 12.02.2023).

[873] Missilery.info (n.a.): R-29RM submarine ballistic missile (RSM-54), Hyperlink: https://en.missilery.info/missile/r29pm (Last visit: 22.01.2023); and: Missile Threat (2021): R-29RM Shtil (SS-N-23), Hyperlink: https://missilethreat.csis.org/missile/ss-n-23/ (Last visit: 23.01.2023).

[874] Missile Threat (2022): RSM-56 Bulava (SS-N-32), Hyperlink: https://missilethreat.csis.org/missile/ss-n-32-bulava/ (Last visit: 23.01.2023).

[875] FAS (2008): Tu-95 BEAR (TUPOLEV), Hyperlink: https://nuke.fas.org/guide/russia/bomber/tu-95.htm (Last visit: 12.02.2023); and: Missile Threat (2021): Kh-55 (AS-15), Hyperlink: https://missilethreat.csis.org/missile/kh-55/ (Last visit: 23.01.2023).

[876] Airforce Technology (2022): Tu-160 Blackjack Strategic Bomber, Hyperlink: https://www.airforce-technology.com/projects/tu-160-blackjack/ (Last visit: 12.02.2023); and: Missile Threat (2021): Kh-55 (AS-15), Hyperlink: https://missilethreat.csis.org/missile/kh-55/ (Last visit: 23.01.2023).

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In regard to common armament, the AS-15A/AS-15B *also known as* Kh-55 (NATO code: AS-15 "Kent"), the missile belongs to the class of air-launched cruise missiles (ALCM) that are available in different subvariants, *inter alia*, with an extended range or in a conventionally armed version. The nuclear-tipped Kh-55 ALCM was first introduced in 1984. It has a range of 2.500 km, and carries a single warhead with 200-250 kiloton TNT equivalent.[877]

Beside the Kh-55 missile, which was mentioned in the 2010 New START Treaty, Russia continued ACLM development and deployed the Kh-101/Kh-102 ALCM in 2012, which can be equipped with a conventional or nuclear warhead. The missile has a range between 2.500 - 2.800 km and its nuclear Kh-102 version carries a nuclear warhead of 250 kiloton TNT equivalent. Both, the Tu-95MS and Tu-160 can carry the ALCM, however, no exact numbers were provided by the CSIS Missile Defense Project.[878]

Taking into account that stocktaking of Russia's nuclear triad in terms of nuclear warheads and delivery systems is more complex due to the less transparent reporting of Russia in comparison to the data available for the U.S. nuclear deterrent, the latest information (as of 2022) is herewith provided as supplement (see Table 5).

Land domain	*Maritime domain*	*Air domain*
RS-18 (only used as launch vehicles for the Avangard Hypersonic Glide Vehicle)	1x Delta III-class submarine with 16 RSM-50 (3 MIRV warheads per missile)	~55x Tu-95MS Bear with up to 16 AS-15 (Kh-55) ALCM or unknown number of Kh-102 ALCM
46 RS-20 with 10 MIRV warheads	6x Delta IV-class submarine with 96 RSM-54 (4 MIRV warheads per missile)	~13x Tu-160 Blackjack with up to 12 AS-15 (Kh-55) ALCM or unknown number of Kh-102 ALCM
135 RS-24 (silo) with 4 MIRV warheads	4x Borey-class submarine with 64 RSM-56 (6 MIRV warheads per missile)	
20 RS-24 (mobile) with 4 MIRV warheads	Unknown number of Typhoon-class submarines as testbed for RSM-56 Bulava	
60 RS-12M (silo-based) with a single-warhead		
18 RS-12M2 (mobile) with a single-warhead		

Table 53: Russia's strategic nuclear triad, based on available data from 2020[879] [own description]

[877] Missile Threat (2021): Kh-55 (AS-15), Hyperlink: https://missilethreat.csis.org/missile/kh-55/ (Last visit: 23.01.2023).

[878] Missile Threat (2021): Kh-101 / Kh-102, Hyperlink: https://missilethreat.csis.org/missile/kh-101-kh-102/ (Last visit: 23.02.2023).

[879] US Congressional Research Service (2022): Russia's Nuclear Weapons: Doctrine, Forces, and Modernization, pp. 18-20, Hyperlink: https://sgp.fas.org/crs/nuke/R45861.pdf (Last visit: 12.02.2023); Airforce Technology (2022): Tu-160 Blackjack Strategic Bomber, Hyperlink: https://www.airforce-

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New strategic offensive missile systems deployed by Russia include the SSC-8/9M729 nuclear-capable intermediate-range cruise missile. Development of the missile already began in the mid-2000s and first prototype flights occurred between 2008 and 2015. Technical specifications on this single warhead ground-launched cruise missile (GLCM) encompass a range of 2.500 km, which constitutes a breach of the INF Treaty. Despite becoming only operationally deployed in 2017 following the period of analysis of this dissertation, the U.S. was looking eagle-eyed on the missile's prototype testing stage. In 2014, U.S. representatives informed the NATO allies about their insights on the Russian missile project by concluding that the missile constituted a formal breach of the INF Treaty (GLCM with a range capability of 500 to 5.500 km). At the end of the analysis period of 2016, the U.S. had still not been successful in pushing Russia towards more transparency regarding the missile's capabilities and thus decided to launch its own GLCM project.[880]

In addition to the strategic nuclear deterrent, Russia owns a considerable stockpile of non-strategic nuclear weapons, estimated to be at around 2.000 warheads (as of 2022). The delivery systems for these warheads include air- and naval-based weaponry as well as short-range ballistic missiles (SRBMs).[881] Given that the 1999 and 2004 NATO enlargements considerably reduced Russia's strategic space between its mainland and the military alliance, the Russian exclave Kaliningrad *oblast* became an important cornerstone for Russia's military strategy towards NATO. In 2016, at the end of the examination period of this dissertation, the Kremlin began to deploy nuclear-capable Iskander SRBMs in Kaliningrad, thus underlining the capability of its threat posture vis-à-vis countries in range of these missiles (mainly the Baltics and Poland, but the missiles could principally also reach Berlin, Germany).[882]

Derived from the analysis of Russia's comprehensive nuclear arsenal which consists of a full strategic nuclear triad as well as a large stockpile of non-strategic nuclear warheads with respective delivery systems, Russia's nuclear threat posture is herewith defined as 'credible' throughout the period of examination.

technology.com/projects/tu-160-blackjack/ (Last visit: 12.02.2023); and: Missile Threat (2021): Kh-101 / Kh-102, Hyperlink: https://missilethreat.csis.org/missile/kh-101-kh-102/ (Last visit: 23.02.2023).

[880] Missile Threat (2022): 9M729 (SSC-8), Hyperlink: https://missilethreat.csis.org/missile/ssc-8-novator-9m729/ (Last visit: 09.12.2022).

[881] US Congressional Research Service (2022): Russia's Nuclear Weapons: Doctrine, Forces, and Modernization, pp. 20 f., Hyperlink: https://sgp.fas.org/crs/nuke/R45861.pdf (Last visit: 12.02.2023).

[882] The Conversation (2022): Kaliningrad: Russia's 'unsinkable aircraft carrier' deep in Nato territory, Hyperlink: https://theconversation.com/kaliningrad-russias-unsinkable-aircraft-carrier-deep-in-nato-territory-182541 (Last visit: 08.10.2022).

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4.3.4 Interim Conclusion: Russia's threat posture

The central aim of subchapter 4.3 was the comprehensive game-oriented analysis of Russia's threat posture in three points of examination (see below). For this endeavour, subchapter 4.3.2 focussed on the credibility of Russia's posture in accordance with the qualitative methodology of subchapter 4.1.1.2, while subchapter 4.3.3 provided an overview on Russia's posture in regard to its key military capabilities examined in line with qualitative methodology of subchapter 4.1.1.2.

Recalling the results from the credibility-related analysis from subchapter 4.3.2,

(1) Russia's 1993 Military Doctrine for initial post-Cold War era (1992) was identified as '**soft**'.

(2) Russia's 2000 Military Doctrine after the first decade of the post-Cold War era (2001) has been **inconclusive**, and

(3) Russia's 2010 Military Doctrine after the second decade of the post-Cold War era (2010) was determined to be '**hard**'.

The individual results of each of the four indicators in line with Table 35 from subchapter 4.3.2.1 are displayed in Table 54 below:

	Initial post-Cold War era (1992)	*After the first decade of the post-Cold War era (2001)*	*After the second decade of the post-Cold War era (2010)*
1. Indicator	Soft	Soft	Hard
2. Indicator	Soft	Hard	Hard
3. Indicator	Soft	Hard	Hard
4. Indicator	Soft	Soft	Hard

Table 54: Overview of the threat posture analysis for Russia from the subchapters 4.3.2.2, 4.3.2.3, and 4.3.2.4 [own description]

Recalling the results from the capability-related analysis performed in the subchapter 4.3.3, the compilation in Table 55 provides a high-level overview per individual domain. For the purpose of analysing Russia as well as proving the value of this analytical instrument, the information in Table 55 and 56 are based on the rDMC dataset only in order to avoid any confusion regarding the definition of the different categories.

The coding of the overview table is a/b/c/d whereof a is 'capable, b is 'partially capable', c is 'non-capable' and d is 'NA'. The numbers indicate the sum of capabilities belonging to each of the categories, whereas '-' means nil.

Military Capability	*Initial post-Cold War era (1992)*	*After the first decade of the post-Cold War era (2001)*	*After the second decade of the post-Cold War era (2010)*
Air domain	2/-/1/1	1/-/2/1	1/-/2/1
Land domain/effects	-/-/4/1	-/1/3/1	1/1/2/1

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Land close air support domain	1/-/2/-	-/-/2/1	-/-/3/-
Maritime domain	-/1/4/-	-/-/5/-	-/-/5/-
Nuclear domain	Capable	Capable	Capable

Table 55: Overview of Russia's capability-based threat posture derived from the Russia:NATO total comparison in subchapter 4.3.3.2, 4.3.3.3, 4.3.3.4, 4.3.3.5, and 4.3.3.6 [own presentation]

As explained in subchapter 4.3.3.6, due to Russia's vast strategic and non-strategic nuclear arsenal, it is counted as capable in the nuclear domain throughout the period of examination. Derived from this capability-based analysis of a Russia:NATO total comparison, Russia provides the following capability performance:

(1) In the Initial post-Cold War era (1992), Russia was 'capable' in four military capabilities,
(2) after the first decade of the post-Cold War era (2001), Russia was 'capable' in two military capabilities and 'partially capable' in one capability,
(3) after the second decade of the post-Cold War era (2010), Russia was 'capable' in three military capabilities and 'partially capable' in one capability,

Military Capability	*Initial post-Cold War era (1992)*	*After the first decade of the post-Cold War era (2001)*	*After the second decade of the post-Cold War era (2010)*
Air domain	2/-/1/1	1/-/2/1	1/-/2/1
Land domain/effects	2/-/2/1	2/1/1/1	2/-/2/1
Land close air support domain	2/-/1/-	2/-/1/1	1/-/2/1
Maritime domain	3/1/1/-	1/-/4/-	1/-/4/-
Nuclear domain	Capable	Capable	Capable

Table 56: Overview of Russia's capability-based threat posture derived from the Russia:NATO-Europe comparison in subchapter 4.3.3.2, 4.3.3.3, 4.3.3.4, 4.3.3.5, and 4.3.3.6 [own presentation]

Derived from this capability-based analysis of a Russia:NATO-Europe total comparison, Russia provides the following capability performance:

(1) In the Initial post-Cold War era (1992), Russia was 'capable' in ten military capabilities and 'partially capable' in one capability,
(2) after the first decade of the post-Cold War era (2001), Russia was 'capable' in seven military capabilities and 'partially capable' in one capability,
(3) after the second decade of the post-Cold War era (2010), Russia was 'capable' in six military capabilities.

Table 57 below summaries the end results of the comprehensive analysis of Russia's threat posture based on the qualitative and quantitative methodology from the subchapter 4.1.2.1 and 4.1.2.2. At this point, it should be stressed again that the results from the capability-based

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analysis are derived from incomplete data and very approximated, which is a common issue also found in capability-related analysis of NATO's military capabilities that also draws upon the rDMC dataset in subchapter 4.4.3). The end results in Table 58, conclude subchapter 4.3.

	Initial post-Cold War era (1992)	*After the first decade of the post-Cold War era (2001)*	*After the second decade of the post-Cold War era (2010)*
Threat Posture - Credibility	Soft	Inconclusive	Hard
Threat Posture – Capability against NATO	Capable (4)	Capable (2) Partially Capable (1)	Capable (3) Partially Capable (1)
Threat Posture – Capability against NATO-Europe	Capable (10) Partially Capable (1)	Capable (7) Partially Capable (1)	Capable (6)

Table 57: Russia's threat posture in the post-Cold War era based on the credibility/capability analysis from subchapter 4.1 [own description]

Following the empirical analysis of Russia as the challenger in the integrated conventional/nuclear deterrence game, the first of the three hypotheses can now be tested.

Recalling the specific hypothesis from subchapter 4.1 below:

> **Hypothesis 1**: The challenger establishes a credible and capable threat posture in order to force the defender and protégé into an immediate deterrence situation through which the challenger hopes to gain the desired change of the *status quo*.

Response: The hypothesis <u>can be confirmed for the credibility</u> of Russia's threat posture, but <u>cannot be confirmed for the capabilities</u> of Russia's military forces.

Justification: By comparing the empirical results for the period of the initial post-Cold War era (Year: ~1992) over the end of the first decade of the post-Cold War era (Year: ~2001) to the end of the second decade of the post-Cold War era (Year: ~2010), Russia moved from a soft over an inconclusive to a hard threat posture. Considering the politico-military context of the periods of examinations, Russia began the initial Cold-War era with a conflict-avoiding soft threat stance. The remnants of the Soviet military were withdrawing from Eastern Europe, while Russia had to cope with the consolidation of its national armed forces.

When the period of time moved one decade forward, a change of power in the Kremlin had just occurred by the transfer of the presidential powers from Yeltsin to Putin. The early Putin years were inconclusive because of contradicting signals.

At the one hand, the Kremlin was very much unsatisfied with the NATO Eastern enlargement, thus triggering Russia that began to receive negative pay-offs from the integrated conventional/nuclear deterrence game because the country was not able to prevent the accession of the former Eastern bloc states into NATO due to international treaties that allowed practically

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a politically induced change of the status quo (i.e.,1975 Helsinki Final Act and 1990 Paris Charter). In this timeframe, Russia has also pursued military reforms but with little to no success.

Lastly, after the second decade of the post-Cold War era, Russia finally reached a hard threat posture in several ways. The 2010 Military Doctrine clearly called out NATO as a military danger together with any NATO-related activities close to Russia's territory. Furthermore, the NATO efforts to develop a BMD system were critically noted in particular due to their implications to the strategic (nuclear) balance. Based on the as a lesson learned from the 2008 Russo-Georgian War, Russia began an ambitions armaments procurement and modernisation programme.

On the side of the military capabilities, Russia began the initial post-Cold War era which a vast stock of conventional and nuclear weapons at its disposal. In view of the politico-military and exogenous economic changes that Russia underwent in the 1990s, the maintenance and development of its military capabilities was not a major priority of the government under President Yeltsin, with the exception of the sustainment of the strategic nuclear forces. By the time that President Putin took over the regency in Moscow, the Russian armed forces had considerably deteriorated in their threat posture from the early 1990s.

With the political shifts around 2008, Russia undertook a new attempt at modernising its conventional military forces following the lessons learned from the 2008 Russo-Georgian War. The reinforced commitment by Russia together with a more robust threat posture can be explained by the integrated conventional/nuclear deterrence game setup that allowed NATO to enlarge without any consideration to the *status quo* change for Russia. By 2008, Russia underlined its military capabilities to fight against a weaker third state while it was not able to challenge NATO or even NATO-Europe by conventional means. By 2014, Russia had continued upon that course, annexed Crimea from Ukraine.

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4.4 NATO's extended general unilateral deterrence in the post-Cold War era

Subchapter 4.4 is separated in four further subchapters. Subchapter 4.4.1 provides a very brief general introduction to the politico-military situation that NATO and its member states found themselves in at the beginning of the post-Cold War era.

Based on the two-pronged approach in accordance with subchapter 4.1.2, the two main parts of subchapter 4.4 are subchapter 4.4.2 and 4.4.3. Subchapter 4.4.2 entails the empirical analysis of Russia's threat posture in terms of credibility. This subchapter is separated in four parts with an introduction at the beginning followed by three subchapter that are reach dedicated to the period under examination as explained in subchapter 4.1.2.1. Subchapter 4.4.3 provides a comprehensive overview on the military capability landscape for NATO in line with the quantitative methodology from subchapter 4.1.2.2. Lastly, subchapter 4.4.4 gives a brief wrap-up with the results of the empirical analysis of NATO as the 'collective' protégé in the integrated conventional/nuclear deterrence game.

4.4.1 An introduction to the early post-Cold War NATO

Since NATO's founding in 1949, nuclear deterrence has played a key role in the deterrence and defence posture of the transatlantic alliance.[883] But even while the Soviet Union was still existing in 1991, the danger of a nuclear escalation - let alone a global strategic nuclear war - had decreased significantly by that year.[884] When the 1989 Fall of the Berlin Wall initiated the transition phase from the Cold War to the post-Cold War era, a general positive attitude of '*Aufbruchsstimmung*' (i.e. a spirit of optimism) between the states and their societies began to revibrate the Euro-Atlantic region at the time.

In order to illustrate this point, a few years after the East-West conflict had ended in 1992, the Pew Research Center conducted a review of a Gallup/Times Mirror public opinion poll in the U.S. from December 1989. In that review, the Center noted that the questioned U.S. Americans had taken – at that moment – an interest in the overcoming of the 'East-West divide', which had been unprecedented in the U.S.; at least in case of a foreign policy issue. Putting feelings to numbers, the Gallup/Times Mirror public opinion polls found out that the questioned U.S.

[883] NATO (2022): NATO's nuclear deterrence policy and forces, Hyperlink: https://www.nato.int/cps/en/natohq/topics_50068.htm (Last visit: 19.07.2022).

[884] The Bulletin of the Atomic Scientists provides a regular update on the threat of nuclear war in the form of the 'Doomsday Clock'. In 1991, the scientists have set the clock at 17 minutes till midnight, which is the biggest gap between outbreak of nuclear war (midnight) and the status of the international system. See: Bulletin of the Atomic Scientists (1991): Editorial – A New Era, Hyperlink: https://thebulletin.org/files/1991%20Clock%20Statement.pdf (Last visit: 05.01.2022).

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Americans expected a positive political (88%) and economic development (71%) for Eastern Europe at the time. Furthermore, and even more astonishing, the U.S. was repeatedly surveyed by Gallup in regard to their views of Russia since 1989 and identified a relatively stable majority at or above the 50%-level with a favourable opinion of Russia throughout the period 1992-1996.[885] This could not be a surprise from a cursory perspective since mass media produced and distributed pictures of people celebrating their newly found freedom in Berlin and many Eastern European capitals, thereby influencing the perception of many people in the West to no small amount. From an U.S. perspective[886], freedom and democracy prevailed over socialism and authoritarianism in Europe and that seemed obviously a good thing for everyone.

In the political arena, high-level talks between the U.S. administration(s) and the primary successor state Russia's new leadership continued throughout the 1990s, producing well-known images, such as a Russian President Yeltsin and U.S. President Clinton fraternising and bursting out in laughter together in front of the press in 1995.[887]

From a more realist-oriented perspective, widespread glorification inherited in those popular opinion polls and public images from the early post-Cold War period should not mislead us to overlooking the global and regional problems of the seemingly victorious new liberal democratic post-Cold War world order. Various crises and civil wars were breaking out or continued to thrive on the African continent, the beginning violent decay of Yugoslavia in the Balkans in South-Eastern Europe, the 1990 Iraq invasion of Kuwait in the Middle East, the retention of authoritarian regimes of China and North Korea in Far East Asia are just selected few examples of tensions, military conflict and civil wars. By the early 1990s, the U.S. used their newly gained leverage in the international system through the politico-military instrument of 'interventionism'[888], for example through military support of the UN mission in Somalia in 1993 or as part of NATO's first crisis response operation in Bosnia and Herzegovina in 1995, as well as in NATO's first military air campaign over Kosovo in 1999.

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[885] Pew Research Center (2014): Berlin Wall's fall marked the end of the Cold War for the American public, Hyperlink: https://www.pewresearch.org/fact-tank/2014/11/03/berlin-walls-fall-marked-the-end-of-the-cold-war-for-the-american-public/ (Last visit: 17.10.2022).

[886] The relationship between the values of U.S. domestic society, including the influential actors throughout every U.S. administration, and the shaping of actual U.S. Foreign Policy has a history of its own that is not further addressed in this doctoral thesis. For a very brief overview of this vast topic, see: Kane, J. (2003): American Values or Human Rights? U.S. Foreign Policy and the Fractured Myth of Virtuous Power, pp. 775-778 and pp. 789-798.

[887] Interesting insights about this anecdote can be found on Clinton's presidential library, see: Clinton Digital Library (n.a.): Laughter and Diplomacy – The 1995 Hyde Park Conference, Hyperlink: https://clinton.presidentiallibraries.us/exhibits/show/hyde-park/hyde-park-press-conference (Last visit: 18.10.2022).

[888] Hawthorn, G. (1999): Liberalism since the Cold War: an enemy to itself?, pp. 145-153, Hyperlink: https://library.fes.de/libalt/journals/swetsfulltext/14965940.pdf (Last visit: 26.11.2022).

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Against the backdrop of increasingly asymmetric (state and ever more non-state) threats to NATO's member states, one might expect that NATO's deterrence and defence posture as an instrument designed for a symmetric conventional (and potentially nuclear) conflict with a peer-competing third state or group of states had lost more and more importance throughout the early post-Cold War years. And while the vast nuclear arsenal that the Soviet Union left to Russia and other successor states still remained of concern for NATO member states[889], it was predominantly perceived as an issue from a nuclear safety, security, and proliferation point of view.[890] So, it was just a logical consequence that with the breakdown of the key adversary, NATO's deterrence and defence posture had to change in order to process a new politico-military environment. Meanwhile, Russia as prime successor state had to undergo massive transformations, given that it had basically lost a significant part of the Soviet Union military potential in terms of territory, human and financial resources as well as the military equipment and parts of the defence industry that went to the other Soviet successor states.[891]

Therefore, four key exogenous events prior 1992 should be at least briefly highlighted in which context NATO formulated its deterrence policy from the initial post-Cold War era onward:

(1) One of those decisive moments had been the physical withdrawal of Soviet forces from the territories of the Warsaw Pact satellite states since 1989. At the time, more than half a million soldiers and several thousands of different types of military equipment were stationed in the central region of the Warsaw Pact encompassing Soviet deployments to the German Democratic Republic, Poland, Czechoslovakia, and Hungary. The starting dates of the first departure of Soviet forces from those countries were June 1989 (Hungary), February 1990 (Czechoslovakia), and April 1991 (Poland). For the Soviet forces in Czechoslovakia, the transfer lasted 18 months, while the force's departure from Poland took until September 1993. The largest number of Soviet forces was deployed in the Eastern part of Germany and in light of these force's role for historical identity of the Soviet Union, the last military remnants of the Soviet Union only left in August 1994.[892]

(2) The fate of West Germany as "an additional bulwark against the perceived Soviet military threat to Central Europe" (Dobbins *et al.*)[893] and of East Germany as 'the principal military-

[889] Duffield described the military challenge posed by the Soviet prime successor Russia as a 'residual threat'. See: Duffield, J. (1995): NATO's Functions after the Cold War, pp. 768 f.
[890] Simpson, J. (1994): Nuclear Non-Proliferation in the Post-Cold War Era, pp. 17 f.
[891] A decisive factor had been the break-away of Ukraine, which employed a considerable fraction of the Soviet military production complex, see: Jaworsky, J. (1996): Ukraine's Armed Forces and Military Policy, p. 223.
[892] Russia Beyond (2020): How the USSR pulled its troops from Eastern Europe, Hyperlink: https://www.rbth.com/history/332046-how-ussr-pulled-its-troops (Last visit: 01.12.2022).
[893] Dobbins, J./McGinn, J./Crane, K./Jones, S./Lal, R./Rathmell, A./Swanger, R./Timilsina, A. (2003): Chapter 2: Germany, p. 11. In: RAND (ed.). America's Role in Nation-Building. From Germany to Iraq, Hyperlink:

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strategic bulwark and mainstay of the Soviet Union's security system in Eastern Europe" (Adomeit)[894] came to an end, when both states reunited on 3. October 1990. The reunification had critical military ramifications for West Germany in particular, such as the challenge of the remaining heavily armed East German armed forces, but also for NATO as a whole for its deterrence and defence posture.[895]

(3) Another historic exogenous watershed moment for NATO had been the formal dissolution of the long-term rival military alliance 'Warsaw Pact' (official designation: Treaty of Friendship, Co-operation and Mutual Assistance) on 25. February/1. July 1991 which preceded the end of the Soviet Union as peer competitor at the end of 1991 by just a few months.[896]

(4) Lastly, the politico-military change of the geopolitical environment in the Euro-Atlantic region were furthermore accompanied by a mutual agreement on conventional force reductions, namely quantities for military equipment essential for offensive operations. When NATO's member states as well as the Eastern bloc states signed the Conventional Forces in Europe (CFE) Treaty[897] in the remit of the Conference on Security and Cooperation in Europe (CSCE) in November 1990, it became a point of reference of the alliance's efforts in reducing its deterrence-related posture.[898]

4.4.2 The credibility of NATO's post-Cold War deterrence and defence posture

This subchapter consists of four further subchapters. Subchapter 4.4.2.1 provides a general introduction to the analysis of the credibility of NATO's deterrence and defence posture in line with the qualitative methodology as presented in subchapter 4.1.2.1. The subchapters 4.4.2.2 to 4.4.2.4 are dedicated to three iterations of the key politico-military document for NATO's

https://www.rand.org/content/dam/rand/pubs/monograph_reports/MR1753/RAND_MR1753.pdf (Last visit: 30.12.2022).

[894] Adomeit, H. (1985): The German Factor in Soviet *Westpolitik*, p. 16.

[895] See: NATO (1990): Address to the North Atlantic Council on the occasion of German Unification, Hyperlink: https://www.nato.int/docu/speech/1990/s901003a_e.htm (Last visit: 30.12.2022).

[896] The following had been member states of the Warsaw Pact: The Soviet Union, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania. One original member (Albania) quit in 1968. For a historic reference, see: NATO (n.a.): What was the Warsaw Pact?, Hyperlink: https://www.nato.int/cps/us/natohq/declassified_138294.htm (Last visit: 26.11.2022).

[897] For general reference to the CFE Treaty, see: ACA (2017): The Conventional Armed Forces in Europe (CFE) Treaty and the Adapted CFE Treaty at a Glance, Hyperlink: https://www.armscontrol.org/factsheet/cfe (Last visit: 01.12.2022).

[898] For references, see, *inter alia*: paragraph 16 in: NATO (1991): Rome Declaration on Peace and Cooperation, Hyperlink: https://www.nato.int/docu/comm/49-95/c911108a.htm (Last visit: 25.06.2022); paragraph 3 in: NATO (1992): Ministerial Communiqué - NATO HQ, Brussels, Hyperlink: https://www.nato.int/docu/comm/49-95/c920401a.htm (Last visit: 04.12.2022); paragraph 16, in: NATO (1992): Ministerial Communiqué - Oslo, Hyperlink: https://www.nato.int/docu/comm/49-95/c920604a.htm (Last visit: 04.2022); or paragraph 8 in: NATO (1993): Press Communiqué M-NAC-2(93)70, Hyperlink: https://www.nato.int/docu/comm/49-95/c931202a.htm (Last visit: 04.12.2022).

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posture credibility, namely its NATO strategic concepts, in line with subchapter 4.1.2.1. The overall results are collected and presented in conjunction with the results from subchapter 4.4.3 in the interim conclusion on Russia's threat posture throughout the examined periods in subchapter 4.4.4.

4.4.2.1 Introduction

In correspondence with subchapter 4.1.2.1 on the determination of each player's credibility through a rigorous text analysis of decisive politico-military documents, the analyses in the subchapters 4.4.2.2, 4.4.2.3, and 4.4.2.4 cover the three instances of NATO's post-Cold War era strategic concepts (see Table 58).

	Early post-Cold War era	*The post-Cold War era after the first decade*	*The post-Cold War era after the second decade*
Politico-military documents	1991 NATO Strategic Concept	1999 NATO Strategic Concept	2010 NATO Strategic Concept

Table 58: Overview of relevant key politico-miliary documents of NATO [own presentation]

Key politico-military documents, such as NATO's strategic concepts, have been the result of a complex policy decision-making process before the respective documents were adopted by the NATO heads of state and government. Due to the high-political level, these documents are not quickly discarded or replaced, as the timeline of the three documents under scrutiny display. It must further be stressed that the full documents were not negotiated at summits only. Rather, there are numerous committees in NATO's day-to-day business, wherein the member states' representatives draft, negotiate and decide on questions at the working-level up to the ambassadors of the highest political committee, the North Atlantic Council (NAC), which contribute to all kinds of draft documents; among them NATO's strategic concepts as well.[899] NATO as a military alliance is dedicated to deterring aggressors from threatening or coercing the alliance member states as well as to defending its member states' territories in case that deterrence fails. Furthermore, and with a view to the previous experiences of the Cold War, a fine balance between the two superpowers in the bipolar world order were an essential component in avoiding a full-scale military conflict in the Euro-Atlantic region. On the basis of subchapter 4.2.2, 4.2.3, and 4.2.4, it is assumed that the strategic balance between Russia and the U.S. in nuclear matters as well as between Russia and the transatlantic alliance as a whole in conventional affairs remained an important cornerstone of the post-Cold War era.

[899] NATO (1992): NATO Handbook, pp. 23-34, Hyperlink: https://archives.nato.int/uploads/r/null/1/4/145732/0050_NATO_Handbook_1992_ENG.pdf (Last visit: 31.01.2023).

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In this sense, the high-level politico-military strategic goals of ‘deterrence and defence’ as well as ‘perseverance of the strategic balance’ are herewith defined as the NATO Level of Ambition (LoA) (see Figure 13).

Derived from the NATO LoA are the operational conventional and nuclear tasks for the alliance’s member states as a whole (the rectangular-shaped box in the middle of Figure 13 below). Furthermore, derived from operational tasks are the individual work tasks for the individual NATO member states (protégés + defender’s role on the left side), the U.S. as key nuclear power (nuclear-armed defender’s role on the right side), and the work tasks that all member states must handle jointly (the NATO ‘collective’ consisting of both defender and protégé in the centre):

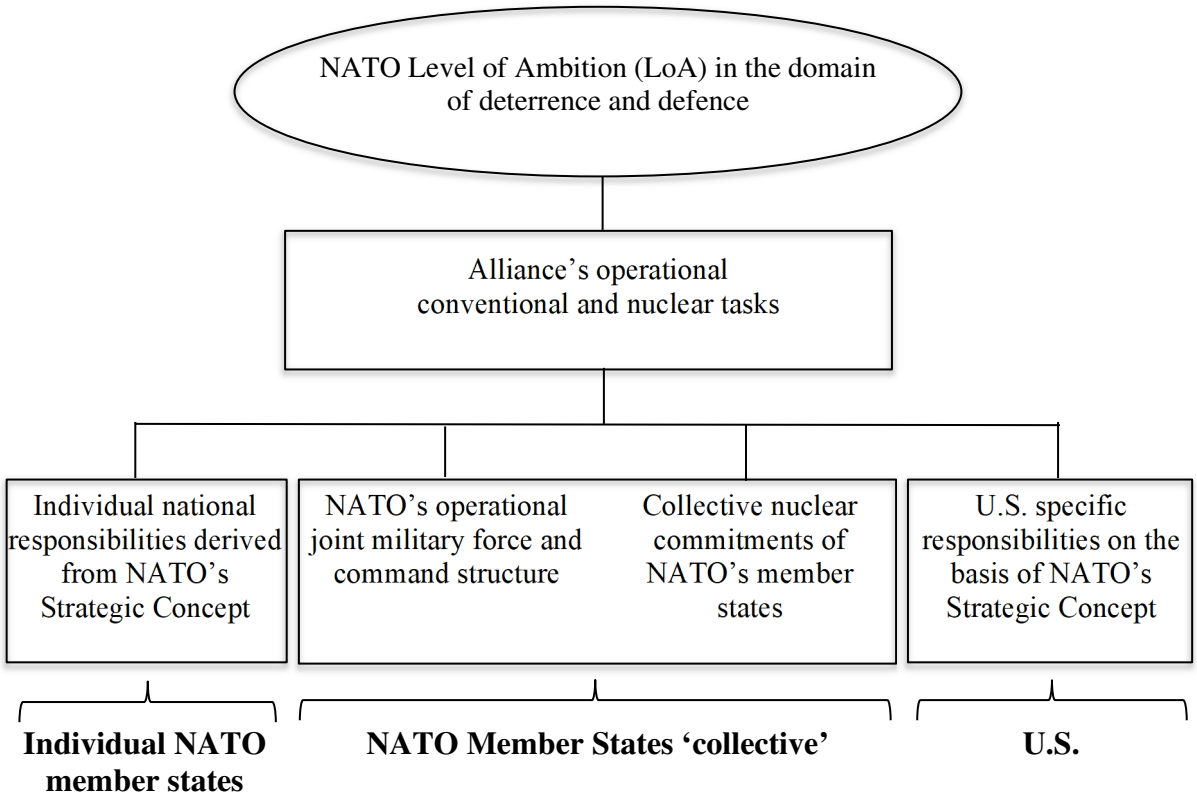

Figure 13: Generic Top-Down definition of NATO’s post-cold War deterrence and defence posture [own illustration]

For the following analysis, NATO is treated as a ‘collective’ of member states that unite the role of protégé and the conventional side of the defender under one ‘roof’. Considering that the allocation of national resources as well as the development, deployment and doctrinal policy development of strategic nuclear weapons (the left- and right-side boxes at the work task level for NATO’s member states in Figure 13), the overlapping work tasks in the central box, namely the development and staffing the NATO Force Structure (NFS) and NATO Command Structure (NCS) as well as the joint commitments of NATO’s non-nuclear and nuclear member states to

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contribute to the nuclear deterrent outside the strategic nuclear deterrent of the nuclear-armed defender, i.e., the U.S., are essential elements of the uniqueness of NATO among other military alliances. As a result of their relevance, the NFS, NCS, and the so-called nuclear sharing arrangement are shortly addressed in order to enable a better understanding about scope of changes that NATO's strategic concepts undertook across these three joint work tasks.

The NCS consists of several headquarters; the exact numbers varied throughout NATO's history. The central purpose of these headquarters is basically the creation of a hierarchical military command and control 'spine' for the forces contributed to the transatlantic alliance. These forces can then be directed at the component (i.e., air, land, and sea), operational, and strategic level. Furthermore, the organisational structure of the NCS is multinational by design because all NATO member states can principally contribute military personnel to the NCS staff. Regardless of the individual contributions per nation, the costs incurred by the operation of the NCS is distributed among NATO member states. At the end of the Cold War, the NCS consisted of 33 individual commands at the above-mentioned levels with a sum of 22.000 staff members. Separated but interlinked with the NCS is the NFS wherein NATO's member states contribute military formations on permanent or temporary basis to joint force structures or individual NATO operations.[900]

NATO's nuclear sharing arrangement dates back to the 1950s and was first and foremost the contribution of the U.S. to a few allied member states (namely the Belgium, West-Germany, Italy, Greece, the Netherlands, and Turkey) which were tasked to deliver non-strategic *or* tactical nuclear weapons to their targets. In compliance with the Non-Proliferation Treaty, the U.S. owned and stockpiled these weapons in U.S. barracks on their allied nations' territory. In case that a NATO member invoked Article 5 and only after the U.S. President directed the release of non-strategic nuclear weapons in Europe, the European NATO allies would gain access to these weapons in order to get them on board of their dual-capable aircraft (DCA).[901]

Given the greater complexity of the NATO's member states 'collective', the soft and hard postures require 'hooks' to the different elements of the individual protégés, the defender, and both together in regard to joint requirements. Subsequently, the hard and soft posture are referenced to the work tasks of the generic top-down definition of NATO' deterrence and defence posture as presented in Figure 13.

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[900] NATO (2018): The NATO Command Structure - Factsheet, p.1, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2018_02/1802-Factsheet-NATO-Command-Structure_en.pdf (Last visit: 07.02.2023).

[901] Center for Arms Control and Non-Proliferation (2021): Fact Sheet: U.S. Nuclear Weapons in Europe, Hyperlink: https://armscontrolcenter.org/wp-content/uploads/2021/08/NATO_NSNW_factsheet.pdf (Last visit: 07.02.2023).

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In order to ensure a quick reference to the indicators for determining the posture of NATO throughout the period of examination, see Table 59 below (i.e., the first three columns are taken from Table 21 from subchapter 4.1.2.1).

No.	*Indicators for a hard posture*	*Indicators for a soft posture*	*Reference to the generic Top-Down definition*
1	Increase/retain a forward presence in allied member states' territory with exposed borders	Limit/remove a forward presence in allied member states' territory with exposed borders	Individual national responsibilities derived from NATO's deterrence and defence posture
2	Definition of clear military capability requirements pertaining to the core task of deterrence and defence	No or limited definition of generalised military capability requirements pertaining to the tasks of the military alliance	Collective commitments by unanimous agreement of NATO's member states
3	Establish a balance between national commitments and multinational formations in the military alliance's deterrence and defence posture	Establish multinational formations as favoured part of the military alliance's deterrence and defence posture	NATO's military operational force and command structure
4	Increase/retain the nuclear dimension of the military alliance's deterrence and defence posture (incl. BMD)	Decrease/limit the nuclear dimension of the military alliance's deterrence and defence posture	U.S. specific responsibilities related to NATO's nuclear deterrence

Table 59: Military alliance 'collective' criteria for each posture in an integrated conventional/nuclear deterrence game, referenced to the generic Top-Down definition in figure 13 [own presentation]

4.4.2.2 NATO's initial post-Cold War deterrence and defence posture

This subchapter provides a review of the first years of the post-Cold War era from the perspective of the NATO member states 'collective'. As a reaction to the pull-back of Soviet troops from Eastern Europe and the prospect for further potential agreements between East and West in the wake of the transformation processes in Eastern Europe, the heads of state and government came together in July 1990 to discuss the proceedings that occurred since the independence movements had taken increasing hold in and control of Eastern European countries. The will of the two German states for their reunification were already visible at the horizon. Following the progress that the Euro-Atlantic region underwent till mid-1991, NATO's member states saw the necessity to adjust their joint strategic guidance for the transatlantic alliance. Thus, the 1991 NATO Strategic Concept was developed and subsequently adopted by the NATO heads of state and government in November 1991.

The first of NATO's post-Cold War concepts (and the fifth one since NATO's foundation in 1949) was an exceptional document in NATO's collective deterrence policy-making because it

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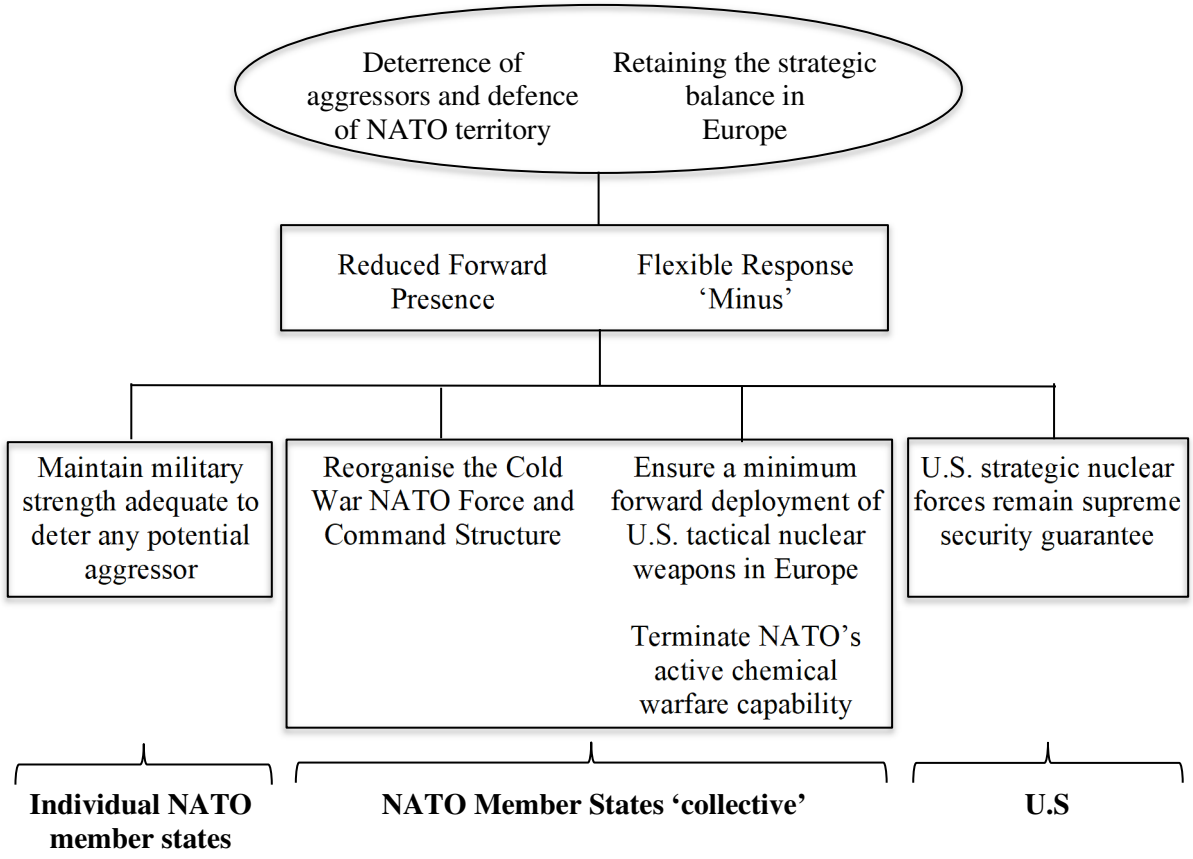
was the first of its kind being written for use as a publicly available unclassified document and formulated in a 'non-confrontational manner' (NATO) from the very beginning. Furthermore, it entailed references to the new NATO's deterrence and defence posture for the transitioning time to the post-Cold War era. The availability to the public provided both an internal and an external added value. NATO's member states could ensure that mutual agreement on the strategic direction of the transatlantic alliance was harmonised in view of the geopolitical changes of the time and communication about the intentions of the military alliance about its further purpose and intentions went out to non-member third states as a signal of transparency and clarity as well. Lastly, this document has also been NATO's first attempt at formulating extended general deterrence without a unifying military threat.[902]

Throughout this subchapter, the 1991 NATO Strategic Concept is analysed in accordance with the game-theoretic structure provided in Figure 13 and Table 59 that were presented in subchapter 4.4.2.1. Thus, the following Figure 14 reflects the translation of the 1991 NATO Strategic Concept into the generic top-down definition of NATO's deterrence and defence posture:



[902] See: Caamano, D. J. S. (2020): Chapter 2 – "This ain't your daddy's NATO": Stating the case for a new Strategic Concept, pp. 16 f., In: *Mariano, S. J. (ed.): NATO's Strategic Foundations: Values, Deterrence, and Arms Control, NATO Defence College, 2020*; and the subparagraph on NATO's Strategic documents since 1949 NATO, here 'The post-Cold War period' and 'NATO's fifth Strategic Concept, 1991', on: NATO (2022): Strategic Concepts, Hyperlink: https://www.nato.int/cps/en/natohq/topics_56626.htm (Last visit: 26.11.2022).

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Figure 14: Top-Down definition of NATO's post-cold War deterrence and defence posture derived from the 1991 NATO Strategic Concept [own illustration]

The 1991 NATO Level of Ambition (LoA): The 1991 NATO Strategic Concept defined the 'fundamental tasks of the alliance' in paragraph 20, two of the four mentioned core tasks of the NATO paid tribute to the organisation's protective origin, namely

> "III. To **deter and defend against any threat of aggression against the territory** of any NATO member state.
> IV. To **preserve the strategic balance within Europe**." (NATO's 1991 Strategic Concept)[903]

It must be understood, that those two core responsibilities are mutually reinforcing at the one hand, but conceptually distinct in terms of their conventional and nuclear implications on the other.[904] Furthermore, considering that the two tasks as presented above were mentioned hierarchically after NATO's role as a 'foundation' of stability for the European security environment based on democratic institutions and as a forum for consultation based on Article 4 of the North Atlantic Treaty for ensuring mitigation of security risks (task I and II of that same paragraph), this placement of NATO's deterrence-related tasks not at the forefront of its security tasks could already be seen as reorientation of the alliance's purpose in the post-Cold War era.[905] For the further analyses, this doctoral thesis understands the combination of (1) NATO's measures for deterring aggressors as well as defending alliance territory, and (2) the preservation of the strategic balance in Europe as the two core elements of the NATO LoA in the general field of deterrence and defence in accordance with the generic top-down definition of NATO's deterrence and defence posture of Figure 13 in subchapter 4.4.2.1.

Considering that geopolitics plays an important role in NATO's LoA, two contextual facts should be stressed at this point.

Firstly, the transatlantic alliance had only one direct border with the Soviet Union during the Cold War. This exposed border has been a strip almost 200 km between Norway and the USSR in the upper North of the country. After the end of the Soviet Union, the border remained obviously, but this time with prime Soviet successor state Russia. Given the continuity of this

[903] See paragraph 20 with subparagraphs III and IV, in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).
[904] For example, Mearsheimer analysed the conventional balance between NATO and the Warsaw Pact on factual categories that include terrain, mobility, and logistics for reinforcements. These elements are obviously not as relevant for the nuclear balance that is rather charged with political considerations. See: Mearsheimer, J. (1988): Numbers, Strategy, and the European Balance, pp. 174-180; and: Mearsheimer, J. (1985): Nuclear Weapons and Deterrence in Europe, pp. 19-26.
[905] See Paragraph 20 with subparagraphs I and II, in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).

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border between NATO and Russia, the question of Norway's exposed border should be considered a different issue from the former bloc-confrontational border in Central Europe alongside the 'Iron Curtain' between former Warsaw Pact members and NATO. For the remainder of this dissertation, the Norway-Russia border issue with its deterrence-related questions is omitted in this dissertation in order to keep the focus on Central Europe.[906]

Secondly, while not spoiling too much for the later history of Russia-NATO relations, the most relevant geographical part of Russia for NATO is its exclave Kaliningrad *oblast*, which enabled Russia the deployment INF-compliant short-range ballistic missiles (SRBM) with a range of maximum 500 km. This could threaten Poland, Lithuania, Latvia, parts of Estonia and a small but important fraction of Germany (i.e., the capital city of Berlin). In view of Russia's modernisation programmes, the deployment of nuclear-capable Iskander-SRBMs in Kaliningrad in 2016 proved the high priority of the exclave for Russia's threat posture as well as NATO's deterrence and defence posture, which had to keep the exclave's military threat in check in parallel to safeguarding the much longer NATO-Russia exposed border along the three Baltic states.[907]

Reduced Forward Presence & Flexible Response 'Minus':

In the Cold War, the forward defence of the transatlantic alliance had been conducted according to NATO's General Defence Plan that mainly focussed on Western Germany as *the* 'frontline' state at the time. Operational tasks had been geographically distributed amongst eight national military corps (three from Western Germany, two from the U.S., and one from each UK, Belgium and the Netherlands) that consisted of more than 20 divisions[908]. There had been little flexibility in the NATO's defence planning, since every military unit had received its dedicated role beforehand and once war would have broken out, the units were intended to fulfil their planned role accordingly. In addition to the forward defence, the U.S., Canada and UK had planned to provide additional massive reinforcement which had been trained annually within the remit of NATO's REFORGER exercise (Return of Forces to Germany). As back-up, further contingency plans that enabled the participation of French forces in a war under NATO command were also worked out.[909] Such tight targeted defence planning was obviously

[906] For more details on Norway's role and standing in NATO, see: NATO (n.a.): NATO and Norway, Hyperlink: https://www.nato.int/cps/en/natohq/declassified_162353.htm (Last visit: 02.12.2022).
[907] The Conversation (2022): Kaliningrad: Russia's 'unsinkable aircraft carrier' deep in Nato territory, Hyperlink: https://theconversation.com/kaliningrad-russias-unsinkable-aircraft-carrier-deep-in-nato-territory-182541 (Last visit: 08.10.2022).
[908] Numerical values for military formations, such as a division's size, can be found in No. V the Appendices.
[909] Williams, N. (2018): Crisis Management versus Collective Defense, pp. 2-6, Hyperlink: https://misc.sam.sdu.dk/files/P.pdf (Last visit: 09.12.2022); and Shlapak, D./Johnson, M. (2016): Reinforcing Deterrence on NATO's Eastern Flank: Wargaming the Defense of the Baltics, pp. 3, Hyperlink:

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becoming obsolete at that moment when Warsaw Pact fell apart without any credible military succeeding threat. Thus, 'reduced forward presence' was first of all a stark reduction of military forces available to NATO.

As a consequence of the changed politico-military realities already emerging in the transition phase when the Warsaw Pact was already gone but the USSR persisted, the 1991 NATO Strategic Concept stressed a new force posture for the alliance:

> "At the London Summit, the Allies concerned agreed to **move away**, where appropriate, **from** the concept of **forward defence towards a reduced forward presence**, and to **modify** the principle of **flexible response to reflect a reduced reliance on nuclear weapons**." (NATO's 1991 Strategic Concept)[910]

Considering the reference to the 1990 London Summit, the details of the conventional and nuclear posture of the transatlantic alliance is scrutinised in more detail in the respective work tasks of the individual NATO member states, the NATO member state 'collective', and the U.S. in its nuclear-armed defender's role (as stated in Figure 14).[911]

Maintain military strength adequate to deter any potential aggressor:

Taking into account that NATO is first and foremost an alliance of sovereign states, thus, the natural starting point of any analysis begins with the individual member state of the alliance.

In the initial post-Cold War era, NATO had a total of 16 member states, two of which were located in North America (Canada and the U.S.), while an additional one was located between Europe and the Middle East (Turkey). With the dissolution of the Warsaw Pact, the geopolitical situation in the Euro-Atlantic region has already begun to shift. NATO's consented view on this situation was optimistic, but cautious:

> "Even in a non-adversarial and cooperative relationship, **Soviet military capability and build-up potential, including its nuclear dimension, still constitute the most significant factor of which the Alliance has to take account in maintaining the strategic balance in Europe**. The **end of East-West confrontation** has, however, **greatly reduced the risk of major conflict** in Europe. On the other hand, there is a **greater risk of different crises arising**, which could **develop quickly** and would require a **rapid response**, but they are **likely to be of a lesser magnitude**." (NATO's 1991 Strategic Concept)[912]

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https://www.rand.org/content/dam/rand/pubs/research_reports/RR1200/RR1253/RAND_RR1253.pdf (Last visit: 08.09.2022).

[910] See paragraph 39, in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).

[911] NATO (1990): London Declaration on a transformed North Atlantic Alliance, Hyperlink: https://www.nato.int/docu/comm/49-95/c900706a.htm (Last visit: 01.12.2022).

[912] See paragraph 13, see: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).

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In view of these multi-dimensional threat vectors that encompass a less and less likely major conventional war with a peer- to superior competitor in Europe to more and more likely disruptive crises with lower intensity levels, NATO's member states were required to cover a broad scope of military capabilities with their national armed forces under the umbrella of NATO. Therefore, the member states committed themselves to

> "[…] **maintain military strength** adequate to convince any potential aggressor that the **use of force against the** territory of one of the Allies **would meet collective and effective action by all** of them and that the **risks involved in initiating conflict would outweigh any foreseeable gains**." (NATO's 1991 Strategic Concept)[913]

If the politico-military assessment of the sources, from which potential threats may come, is compared to the 'guidelines for the Alliance's force posture', a certain area of tension emerged between the national military planning that contemplated considerable force reductions and the retention of NATO's deterrence and defence posture.

> "[…] **overall size of the Allies' forces**, and in many cases their readiness, **will be reduced** [and] maintenance of a **comprehensive in-place linear defensive posture in the central region will no longer be required**. The **peacetime geographical distribution of forces** will ensure a **sufficient military presence throughout the territory of the Alliance**, including **where necessary forward deployment** of appropriate forces." (NATO's 1991 Strategic Concept)[914]

By time that the 1991 NATO Strategic Concept was adopted, the 2+4 Treaty for the reunification of the two German states in a unified Germany had brought the Eastern German territory into NATO (albeit with the restriction that no NATO allied troops would be stationed there) [915] and Soviet troops were still continuing their withdrawal from Eastern Europe. Even if only the Warsaw Pact was dissolved at the time, NATO had immediately acquired additional 'strategic distance' of around 700 km[916] to the national territory of the USSR. Thus, moving from a full-fledged 'forward presence' to a 'reduced forward presence' largely enabled continued credibility of NATO's deterrence at a lower cost for the allies without harming the extended general deterrence posture of the transatlantic alliance in the heart of Europe; at least too much. And despite that this distance was still technically easy to overcome for land-based

[913] See paragraph 35, see: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).
[914] See paragraph 45 a) and b), in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).
[915] Deutschland.de (2015): Two Plus Four Treaty, Hyperlink: https://www.deutschland.de/en/topic/politics/germany-europe/two-plus-four-treaty (Last visit: 04.12.2022).
[916] Distance between Berlin, Germany, and Brest, Belarus (formerly part of the USSR). See: Luftlinie.org (2022): Entfernungsrechner, Hyperlink: https://www.luftlinie.org/Berlin,DEU/Brest,BLR (Last visit: 02.12.2022).

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shorter-range ballistic/cruise missiles[917], the provisions of the INF Treaty[918] ensured that those missile systems became in-operational for both sides, thereby limiting the threat from nuclear attacks with short periods of warning.

Based on the lower threat posture that the Soviet Union/USSR posed in the transition period at the beginning of the 1990s, Table 54 provides an overview of two key benchmarks for the defence policies of NATO's member states for the reference year 1992 (also used as baseline in subchapter 4.4.3:

	Def. exp. per GDP in percentage		*Difference*	*Armed Forces (in thousand)*		*Difference*
	1992	***1990***		***1992***	***1990***	
Belgium	1,83	2,36	-22,5%	79	106	-25,5%
Denmark	1,89	2,02	-6,4%	28	31	-9,7%
France	2,69	2,81	-4,3%	522	550	-5,1%
Germany	1,86	2,52	-26,2%	442	545	-18,9%
Greece	3,63	3,80	-4,5%	208	201	3,5%
Iceland	N/A	N/A	N/A	N/A	N/A	N/A
Italy	1,75	1,88	-6,9%	471	493	-4,5%
Luxembourg	0,83	0,79	5,1%	1	1	+/-0%
Netherlands	2,21	2,37	-6,8%	90	104	-13,5%
Norway	2,96	2,89	2,4%	36	51	-29,4%
Portugal	2,39	2,44	-2,0%	80	87	-8,0%
Spain	2,04	2,29	-10,9%	198	263	-24,7%
Turkey	3,87	3,53	9,6%	704	769	-8,5%
UK	3,86	3,98	-3,0%	293	308	-4,9%
NATO-Europe	**2,45 (av)**	**2,59 (av)**	**-5,4%**	**3.152 (sum)**	**3.509 (sum)**	**-10,2%**
Canada	1,86	1,96	-5,1%	82	87	-5,7%
U.S.	4,97	5,61	-11,4%	1.920	2.180	-11,9%
NATO total	**2,58 (av)**	**2,75 (av)**	**-6,2%**	**5.154 (sum)**	**5.776 (sum)**	**-10,8%**
Russia	*4,43*	--	--	*1.900*	--	--

Table 60: Defence expenditures/GDP and Armed Forces personnel numbers in comparison, 1992<->1990[919]; with arithmetic average (av) of defence expenditures and sum of armed forces [own presentation]

In terms of defence expenditures per GDP, a trend for the clear decrease could be identified across almost all of NATO's 16 member states at the time with the notable exemption of Turkey (+9,6 percent) which might be explained by the known Turco-Greek politico-military divide

[917] Such weapons were in the Soviet arsenal for a long time, see: York, H. (1975): The Nuclear "Balance of Terror" in Europe, p. 204.

[918] See Article I in conjunction with Article II, paragraph 6, in: NTI (n.a.): Treaty on the Elimination of Intermediate-Range and Shorter-Range Missiles between USA and USSR (INF Treaty), p. TINF 1, Hyperlink: https://media.nti.org/documents/inf_treaty.pdf (Last visit: 04.12.2022).

[919] SIPRI (2022): SIPRI Military Expenditure Database, Hyperlink: https://milex.sipri.org/sipri (Last visit: 23.12.2022); and Armed Forces data derived from: WorldBank (2022): Armed forces personnel – total, Hyperlink: https://data.worldbank.org/indicator/MS.MIL.TOTL.P1 (Last visit: 08.01.2022).

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that continued to persist after the end of the Cold War. The largest profiteer from the transition phase was Germany (-26,2 percent), which might also be easily explainable by the decreased threat level due to the dissolution of the Warsaw Pact and lastly the German reunification, which changed the implications of the inner-German exposed border. Other major 'winners' of the early peace dividend had been Belgium (-22,5 percent), the U.S. (-11,4 percent), and Spain (-10,9 percent).

The overall average decrease of the defence expenditures of the NATO states in Europe had been marginally smaller (-5,4 percent) in comparison to the average of the NATO total (-6,2 percent), mainly due to the U.S. defence expenditure decrease (-11,9 percent).

Before addressing the military personnel situation of the initial post-Cold War, it is useful to take a step back to recall the politico-military situation at the time in conjunction with the topic of forward deployment of forces in Europe.

Back in the Cold War, the foreign military presence in Western Germany within the remit of NATO's forward deployment had been a persistent factor in alliance coherence and interoperability. In the same vein, NATO made use of the military headquarters of two forward deployed military forces, the British Army of the Rhine (located in Rheindahlen) and the U.S. Army in Europe (located in Heidelberg).[920] Given that the forward presence of the military forces from the nuclear-armed defender in the integrated convention/nuclear deterrence game should be attributed a higher relevance, the deployment of U.S. military personnel in Europe (not only in Germany!) was used as an additional benchmark for a national commitment for the contribution of national forces to NATO:

	1992	***1990***	***Difference***
U.S. Military Personnel Forward Deployment to Europe (in thousand)	183	287	-36,2%

Table 61: U.S. military personnel in Europe, comparison 1992 <-> 1990[921] [own presentation]

Putting the evolution of defence expenditures and military personnel numbers per member state as well as the forward deployed military personnel of the U.S. in Europe from the Cold War (1990) to the initial post-Cold War era year (1992) in relation, NATO had already lost around ten percent of its armed forces. In regard to the nuclear-armed defender, if the U.S. forces in Europe had been defined as 'armed forces' on their own, then the U.S. would be in the lead in

[920] NATO (n.a.): Germany and NATO, Hyperlink: https://www.nato.int/cps/en/natohq/declassified_185912.htm (Last visit: 31.01.2023).

[921] Statista (2022): Number of United States military personnel in Europe from 1950 to 2021, Hyperlink: https://www.statista.com/statistics/1294309/us-troops-europe/ (Last visit: 05.06.2022).

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regard to force reductions (-36,2 percent), followed by Norway (-29,4 percent), Belgium (-25,5 percent), and Spain (-24,7 percent) in 1992 in comparison to their 1990 military personnel quantities. Furthermore, it should not be left behind that Germany (-18,9 percent), the Netherlands (-13,5 percent), and the continental U.S. (-11,9 percent) had decreased personnel numbers above both NATO-Europe and NATO total averages. However, a comparison of post-Cold War Russian armed forces with NATO total and NATO-Europe forces derived from the data in Table 56 shows that Russia's military personnel was only 2/3 of NATO-Europe's combined forces and less than 1/2 of NATO's total forces. Thus, NATO had laid the foundation of becoming the dominant conventional power in the Euro-Atlantic alliance (at least in regard to the quantity of soldiers).

Reorganise the Cold War NATO Force and Command Structure:

In the Cold War, the operation of military formations itself under NATO command had been mostly conducted nationally but with a persistent training in order to remain interoperable in battle.[922] In view of the dissolution of the Warsaw Pact, the member states of the transatlantic alliance were quick to decide on a potential vision of NATO's future conventional forces which should continue to be interoperable, but increasingly multinational structure:

> "NATO will field **smaller and restructured active forces**. These forces will be **highly mobile and versatile** so that Allied leaders will have maximum flexibility in deciding how to respond to a crisis. It will **rely increasingly on multinational corps made up of national units**." (1990 NATO London Summit)[923]

In comparison, the wording of the 1991 NATO Strategic Concept made clear that NATO's allies expected multinational forces only to be a complement to national force commitments to NATO:

> "For the Allies concerned, **collective defence** arrangements will **rely increasingly on multinational forces, complementing national commitments to NATO**. **Multinational forces, and in particular reaction forces, reinforce solidarity**. They can also provide a way of deploying **more capable formations than** might be available **purely nationally**, thus helping to make more efficient use of scarce defence resources." (NATO's 1991 Strategic Concept)[924]

[922] Williams, N. (2018): Crisis Management versus Collective Defense, pp. 2-6, Hyperlink: https://misc.sam.sdu.dk/files/P.pdf (Last visit: 09.12.2022); and Shlapak, D./Johnson, M. (2016): Reinforcing Deterrence on NATO's Eastern Flank: Wargaming the Defense of the Baltics, pp. 3, Hyperlink: https://www.rand.org/content/dam/rand/pubs/research_reports/RR1200/RR1253/RAND_RR1253.pdf (Last visit: 08.09.2022).

[923] NATO (1990): London Declaration on a transformed North Atlantic Alliance, Hyperlink: https://www.nato.int/docu/comm/49-95/c900706a.htm (Last visit: 01.12.2022).

[924] See paragraph 53, in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).

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In the 1991 NATO Strategic Concept, the distinction between purely national and multinational forces as well as the characteristics of these multinational forces as seen by NATO's member states represents an important insight into the general motivation behind the increasing reliance an such formations. There were two specific arguments. The first one is a military one, namely increased speed of an alliance reaction to crises, and the political one, i.e., a 'show of alliance solidarity' by the alliance to the NATO ally under threat.

Since 1960, NATO had employed a small task force of around 5.000 military personnel[925], which was called the Allied Command Europe Mobile Force (ACF). Contributors composed of land and air forces were Belgium, Canada, Germany, Italy, Luxembourg, the Netherlands, the UK, and the U.S., which kept their military units in their home bases until deployment under the command of the Supreme Allied Commander Europe (SACEUR). ACF was intended for rapid deployments in immediate crisis scenarios in order to underline NATO's commitment as a 'show of solidarity' within the remit of NATO's wider deterrence and defence posture.[926]

In the maritime domain, NATO had created the Standing Naval Force Atlantic (STANAVFORLANT) in 1967 under command of the Supreme Allied Commander Atlantic (SACLANT). The maritime unit consisted of a permanent formation supported by Canada, Germany, the Netherlands, UK, and U.S., which was occasionally supplemented with ships from Belgium, Denmark, Norway, and Portugal.[927]

Furthermore, the post-Cold War Standing Naval Force Mediterranean Sea (STANAVFORMED) began to evolve from a short-notice formation, also known as Naval On-Call Force for the Mediterranean into a permanent formation. The revised flotilla was established in April 1992 with a continuous contribution of ships from Germany, Greece, Italy, the Netherlands, Spain, Turkey, UK, and the U.S.[928]

Ensure a minimum forward deployment of U.S. tactical nuclear weapons in Europe:

[925] This corresponds to the upper threshold of a brigade-sized military formation. For reference, see No. V in the Appendices.

[926] NATO (1992): NATO Handbook, pp. 111 f., Hyperlink: https://archives.nato.int/uploads/r/null/1/4/145732/0050_NATO_Handbook_1992_ENG.pdf (Last visit: 31.01.2023).

[927] NATO (1992): NATO Handbook, pp. 112 f., Hyperlink: https://archives.nato.int/uploads/r/null/1/4/145732/0050_NATO_Handbook_1992_ENG.pdf (Last visit: 31.01.2023).

[928] NATO (1992): NATO Handbook, pp. 113., Hyperlink: https://archives.nato.int/uploads/r/null/1/4/145732/0050_NATO_Handbook_1992_ENG.pdf (Last visit: 31.01.2023).

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In 1991, the NATO had a total of 4.000 tactical warheads deployed in Europe.[929] The reductions in NATO's nuclear commitment have been specified within the remit of the 1991 Taormina meeting of the NATO Nuclear Planning Group (NPG) as the central NATO committee responsible for the alliance's nuclear policy, including issues such as nuclear proliferation, safety and security[930]. The final communiqué of the NPG under chairmanship of the then-NATO Secretary General Manfred Wörner basically endorsed the U.S. decision for (1) the withdrawal of all tactical nuclear ground-launched short-range ballistic missiles and field artillery as well as destruction of the related nuclear warheads (conducted in reciprocity to the USSR), (2) the removal of all tactical nuclear weapons from maritime vessels, including attack submarines and land-based naval aircraft, and lastly (3) the withdrawal of 80% of the air-to-ground tactical nuclear weapons from Europe.[931]

Subsequently, the 1991 NATO Strategic Concept formulated a post-Cold War nuclear policy that principally displayed the facts that NATO's member states had agreed upon:

> "They [i.e. the allies] will maintain adequate **sub-strategic forces based in Europe** which will provide an essential link with strategic nuclear forces, reinforcing the trans-Atlantic link. These will consist **solely of dual capable aircraft** which could, if necessary, be **supplemented by offshore systems**. **Sub-strategic nuclear weapons** will, however, **not be deployed** in normal circumstances **on surface vessels and attack submarines**. There is **no requirement for nuclear artillery or ground-launched short-range nuclear missiles** and they **will be eliminated**." (NATO's 1991 Strategic Concept)[932]

As a consequence, NATO implemented the nuclear-related decision of the strategic concept, *albeit* at heightened speed, and stated in 1992 that

> "**[a]ll nuclear warheads from NATO's ground-launched** and **naval tactical nuclear weapons have […] been removed**, much earlier than originally envisaged, and those weapons designated to be destroyed are being retired and scheduled for destruction. The **reductions in the number of air-delivered nuclear weapons**, the **only remaining sub-strategic systems to be held by the Alliance in Europe**, are underway." (NATO NPG – Final Communiqué, Oct. 1992)[933]

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[929] See subchapter 'Nuclear Weapons in the 1990s', in: ACA (1999): NATO's Nuclear Weapons: The Rationale for 'No First Use', Hyperlink: https://www.armscontrol.org/act/1999-07/features/natos-nuclear-weapons-rationale-first-use (Last visit: 31.01.2023).

[930] NATO (2022): Nuclear Planning Group (NPG), Hyperlink: https://www.nato.int/cps/en/natohq/topics_50069.htm (Last visit: 30.11.2022).

[931] For reference, see paragraph 4 and 5 in: NATO (1991): Nuclear Planning Group (NPG) – Final Communiqué, Oct. 1991, Taormina, Italy, Hyperlink: https://www.nato.int/docu/comm/49-95/c911018a.htm (Last visit: 30.11.2022).

[932] See paragraph 56, in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).

[933] NATO (1992): Nuclear Planning Group (NPG) – Final Communiqué, Oct. 1992, Gleneagles, Scotland, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23977.htm (Last visit: 31.01.2023).

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After the mass removal of U.S. tactical nuclear weapons from Europe, only a limited number of nuclear gravity bombs, delivered by dual-capable aircraft (i.e., being able to fulfil a conventional and nuclear role), remained in Europe. After 1992, the quantity was assumed to be of around 400 tactical bombs from the U.S. arsenal, while France and the UK were also assumed to deactivate their own tactical nuclear weapons completely.[934]

In conjunction with the multinational forces, questions concerning the command and control of those force as well as the enabling of interoperability across all national forces contributed to NATO operations might arise. The 1991 NATO Strategic Concept was rather minimalistic in language in regard to the NATO Command Structure (NCS).

> "In the new security environment and **given the reduced overall force levels in future**, the **ability to work closely together**, which will facilitate the cost effective use of Alliance resources, will be **particularly important for the achievement of the missions** of the Allies' forces. The Alliance's collective defence arrangements in which, for those concerned, the **integrated military structure**, including multinational forces, plays the key role, **will be essential in this regard**." (NATO's 1991 Strategic Concept)[935]

After 1991, a considerable restructuring of the NCS were undertaken by NATO's member states in order to enable the continuous conduct of operations of the transatlantic alliance, while streamlining or dissolving subordinate commands at the operational level throughout the NCS. It should be stressed at this point that particularly the higher commands briefly addressed here are, in fact, multinational commands that are manned by military officers from practically all NATO's member states. Given the complexity of the undertaking to provide command and control for a jointly operating military force that consists of national formations from more than a dozen member states, only a snapshot can be provided at this point. Changes occurred throughout the NCS, but the most noteworthy in the scope of this dissertation should be those at the major command-level, where the Cold War structure of three major NATO commands (Allied Command Europe, Allied Command Atlantic, Allied Command [English] Channel) was scaled down to two post-Cold War strategic commands (Allied Command Europe and Allied Command Atlantic). This central decision represented probably the most continuous one in the NCS at the highest level, given that NATO retained the bi-strategic command structure – as the

[934] See subchapter 'Nuclear Weapons in the 1990s', in: ACA (1999): NATO's Nuclear Weapons: The Rationale for 'No First Use', Hyperlink: https://www.armscontrol.org/act/1999-07/features/natos-nuclear-weapons-rationale-first-use (Last visit: 31.01.2023).

[935] See paragraph 51, in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).

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'Major NATO Commands for Europe and the Atlantic' were called since the 1995 NATO Long Term Study – till today (2023).[936]

Terminate NATO's active chemical warfare capability:

Considering nuclear weapons were not the only type of the so-called 'weapons of mass destruction' (*or* WMD) available to NATO in the Cold War, it is valuable to at least briefly address the issue of chemical weapons.

Taking into account that the Soviet Union had owned large stocks of chemical weapons since the end of World War II, with the Soviets might had intended to use in a potential war with NATO, the U.S. and France had retained such weapons in their own national stocks as well. Although, negotiations between the U.S and the USSR about the chemical weapons disarmament since the mid-1970s were ongoing, those NATO member states had kept in chemical weapons just in case that a reciprocal response to a Soviet use of chemical weapons in a military conflict with the transatlantic alliance was needed. The substantial U.S. chemical stockpile, which was mainly located in the continental United States as well as closely guarded in national facilities in Western Germany, had not played a major role in NATO's defence planning due to limited utility for retaliatory measures in conflict. Also, NATO and Soviet forces continued to developed robust protective gear against chemical warfare, rendering this WMD less effective on the battlefield than comparable conventional weapons, while the effects on unprotected populations would have been considerable (especially, if chemical weapons were to be deployed in a defensive position on allied territory).[937]

It was therefore not surprising that NATO was unilaterally willing to abandon offensive chemical weapons as part of its post-Cold War era non-strategic WMD arsenal, while preserving defensive capabilities against potential chemical attacks[938]:

> "Alliance strategy is **not dependent on a chemical warfare capability**. […] But, even after implementation of a global ban, **precautions of a purely defensive nature will need to be maintained**." (NATO's 1991 Strategic Concept)[939]

[936] Pedlow, G. (n.a.): The Evolution of NATO's Command Structure, 1951-2009, pp. 11 f., Hyperlink: https://shape.nato.int/resources/21/Evolution%20of%20NATO%20Cmd%20Structure%201951-2009.pdf /Last visit: 01.02.2023).

[937] Meselson, M./Robinson, J. P. (1980): Chemical Warfare and Chemical Disarmament, pp. 38-47.

[938] The devaluation of chemical weapons for inter-state warfare was further reinforced by the Chemical Weapons Convention (CWS) initiated in 1993 and going-in-force in 1997. The completion of Russia's chemical weapons occurred in September 2017 and projected termination of U.S. chemical arsenal was foreseen for September 2023. For reference, see: ACA (2020): The Chemical Weapons Convention (CWC) at a Glance, Hyperlink: https://www.armscontrol.org/factsheets/cwcglance (Last visit: 01.12.2022).

[939] See paragraph 50, in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).

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Thus, from 1991 onward, NATO did not consider the offensive use of chemical weapons a military strategy anymore and restricted itself in full accordance with international treaties, such as the Chemical Weapons Convention (CWC), to defensive measures for protecting against chemical attacks by CWC non-compliant states or non-state terrorist actors.

U.S. strategic nuclear forces remain supreme security guarantee:

The 1991 NATO Strategic Concept provides a minimal description of the strategic nuclear dimension of NATO's deterrence and defence posture in paragraphs 54 which underlined the general consensus between NATO's member states since the beginning of NATO in 1949:

> "The **fundamental purpose of the nuclear forces** of the Allies **is political**: to **preserve peace** and **prevent** coercion and any kind of war. They will continue to fulfil an essential **role by ensuring uncertainty in the mind of any aggressor about the nature of the Allies' response to military aggression**. They demonstrate that **aggression** of any kind is **not a rational option**. The **supreme guarantee** of the security of the Allies is provided by the **strategic nuclear forces** of the Alliance, **particularly those of the United States**; the **independent nuclear forces of the United Kingdom and France**, which have a deterrent role of their own, **contribute to the overall deterrence** and security of the Allies." (NATO's 1991 Strategic Concept)[940]

In accordance with the integrated conventional/nuclear deterrence game structure, it is the dedicated task of the nuclear-armed defender to provide a comprehensive conventional (and limited nuclear) deterrent for its protégés.

Following the application of the four operational indicators in Table 59 of subchapter 4.4.2.1 on the 1991 NATO Strategic Concept, the NATO 'collective' employed an inconclusive deterrence and defence posture in the initial-Cold War era (excluding the U.S. extended nuclear deterrence for NATO which is separately addressed in subchapter 4.5).

The individual results from the evaluation of the four indicators leading to that inconclusive result were the following:

(1) *Increase/retain a forward presence in allied member states' territory with exposed borders (hard)*:

By the time that the 1991 NATO Strategic Concept was compiled, the U.S. still retained a considerable but decreasing number of forward deployed troops in Europe. Meanwhile, a few European NATO member have already begun to cut their defence expenditure as well as armed forces personnel. By comparing the force reductions of NATO with the tremendous drop in the Soviet Union's and subsequently early post-Cold War Russia's

[940] See paragraph 54, in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).

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threat posture that was marked by a massive conventional retreat from the former Warsaw Pact members (including Eastern Germany), NATO's member states were not heedlessly reducing their armed forces but did so based on the mutually agreed future strategic balance derived from the 1990 CFE Treaty (see subchapter 4.2.2).

(2) *No or limited definition of generalised military capability requirements pertaining to the tasks of the military alliance (soft)*:

After the Warsaw Pact has disbanded and the former socialist Eastern European countries have become independent, NATO's defence planning became obsolete in an instant because all joint efforts by this Cold War military alliance was targeted at deterring the Eastern bloc and defending Western Europe in case of a large-scale war. From this point of view and considering the politico-military thinking that was shaped increasingly by the early beginnings of crisis management operations in Europe's periphery, defence planning was not one of the priorities for NATO at the time.

(3) *Establish a balance between national commitments and multinational formations in the military alliance's deterrence and defence posture (hard)*:

The 1991 NATO Strategic Concept provided an ambivalent statement on the topic of multinational formations. While the transatlantic alliance acknowledged and intendedly pursued the establishment of multinational formations in order to tackle, inter alia, out-of-area missions and operations that were soon to follow, it also stressed that such measures can only complement national commitments. Hence, NATO's member states were not supposed to rely on the multinational formations for the alliance's defence.

(4) *Decrease/limit the nuclear dimension of the military alliance's deterrence and defence posture (soft)*:

Following the disbandment of the Warsaw Pact and the subsequent massive removal of conventional troops with nuclear weapons back to the Soviet Union (and later on Russia), the U.S. pushed for a massive decrease in its forward deployed non-strategic nuclear weapons. In the years to come after 1992, the U.S. subsequently withdrew unpreceded amounts of those weapons from Europe and only leaving a continuously shrinking number of nuclear gravity bombs in U.S. controlled shelters. These were intended not as a warfare capability but as a political signal towards its non-nuclear European NATO allies that were, thus, reassured by the U.S. regarding its extended nuclear deterrence while the U.S. required European allies to continue the provision of dual-capable aircraft.

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4.4.2.3 NATO's deterrence and defence posture after the first decade of the post-Cold War era

At the end of the second millennium of world history, NATO had remained a steadfast politico-military pole in the Euro-Atlantic region, which had to cope with three different factors concerning the domains of politics, military, and identity.

(1) On the political side, the transatlantic alliance accepted three new – former Socialist bloc – members, namely Poland, Hungary, and the Czech Republic in 1999. At the same time that the invitation for accession to these three countries was issued by NATO, the 1997 NATO-Russia Founding Act has been signed to accommodate Russia's national security concerns regarding NATO's Eastern enlargement; the details of the Founding Act were discussed in subchapter 4.2.5.

(2) On the military side, NATO began to face an unprecedented 'gamechanger' that it did not expect after more than 50 years of its existence, namely non-Article 5 military operations in crisis management. The transatlantic alliance had considerable conventional forces at its disposal, but NATO Command Structure (NCS) was struggling with the effective execution of such operations, because it was devised for fighting a large-scale conventional and potentially nuclear war in Central Europe. The lessons learned by the alliance and its member states since the first out-of-area operations beyond NATO territory in the mid-1990s led to a comprehensive review of its politico-military policies, structures, planning, capabilities, and last but not least, to the further opening of NATO towards partnership cooperation formats.[941]

(3) In regard to its identity, the issue was first and foremost a European moral dilemma. At the one hand, the Europeans were convinced that they should have been able to deal with the problems on the Balkans without the U.S. On the other hand, the European NATO member states were well aware of their own military shortcomings and could not tackle the issue with their own military capabilities. This made the European politicians in NATO's member states as well as the European decision-making circles of the European Union thinking about how to overcome their common inabilities without harming the transatlantic relationship to the North American side of NATO (the U.S. and Canada).[942] While the question of an EU-NATO cooperation in defence and security matters is not part of the analysis of NATO's deterrence and defence posture,

[941] Wallander, C. (2000): Institutional Assets and Adaptability: NATO after the Cold War, pp. 717-723.
[942] James, A. (n.a.): European Security and Defence Identity and NATO: Implications for Canada, pp. 25-34, Hyperlink: https://www.cfc.forces.gc.ca/259/181/62_james.pdf (Last visit: 05.02.2023).

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it is treated, nevertheless, as an important backdrop for the evolution of NATO after the first decade of the post-Cold War era.

Based on the information derived from the 1999 NATO Strategic Concept, the Top-Down definition of NATO's deterrence and defence posture was adapted accordingly. Figure 15 below provides the resulting baseline from 1999 onward for the timeframe until the end of the second decade of the post-Cold War era (2010).

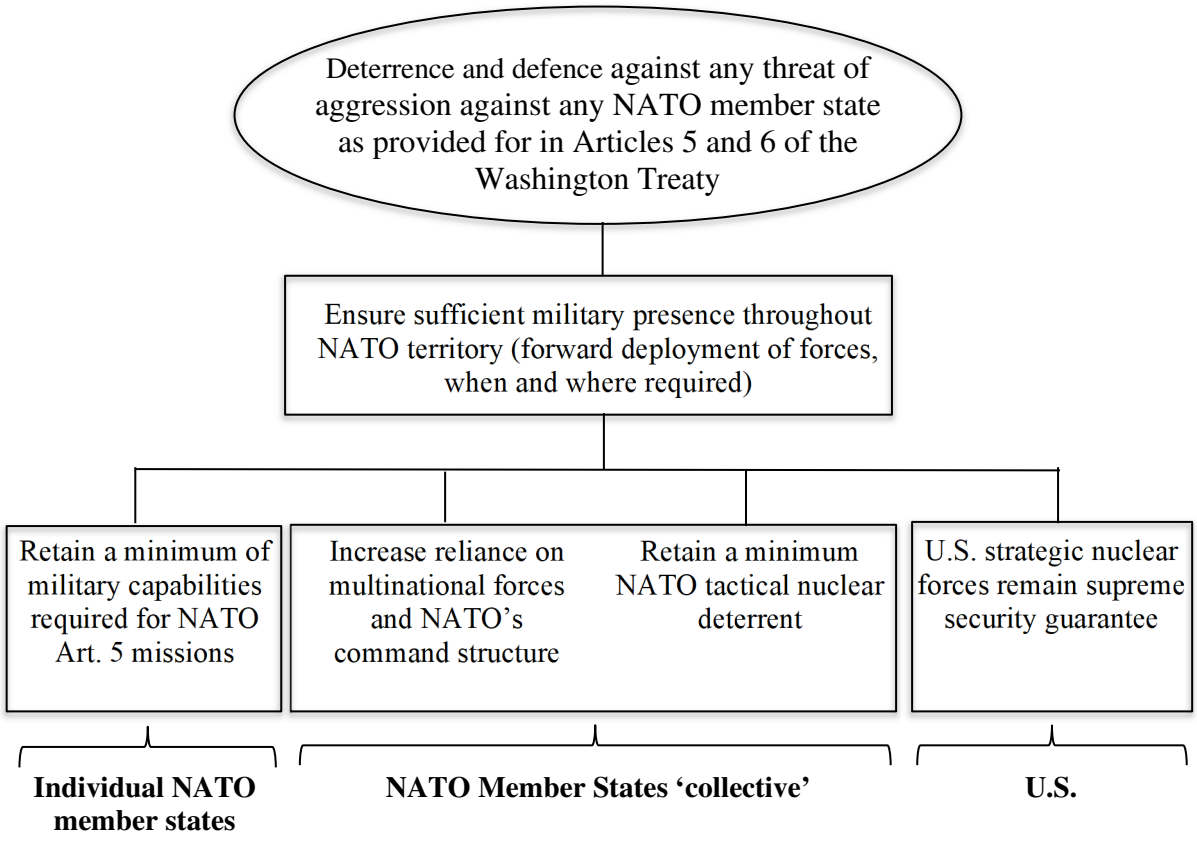

Figure 15: Top-Down definition of NATO's post-cold War deterrence and defence posture derived from (and after) the 1999 NATO Strategic Concept [own illustration]

The 1991 NATO Level of Ambition (LoA):

A word search for 'deterrence' in NATO's 1999 Strategic Concept as adopted by the Heads of State and Government provides four hits in 65 paragraphs and puts the new concept slightly ahead of the one hit document that the 1991 NATO Strategic Concept had been. The most notable mention can be found in paragraph 10 where the three central tasks of the transatlantic alliance are summarised.

> "**Deterrence and Defence**: To **deter** and defend against **any threat of aggression against any NATO member state** as provided for in **Articles 5** and 6 of the Washington Treaty." (1999 NATO Strategic Concept)[943]

[943] See paragraph 10, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).

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Similar to the structure of the 1991 NATO Strategic Concept, the aspect of deterrence and defence was mentioned only after NATO's other high-level political strategic goals of 'security' and 'consultation'.[944] Thus, the concept of 1999 remains in continuity to the one of 1991, given that the major milestones in the 1999 document are non-Article 5 related and have a strong focus on partnerships and multinational dialogue.[945]

Ensure sufficient military presence throughout NATO territory:

Recalling that the 1991 NATO Strategic Concept had already introduced the basic concept of flexible forward deployment of forces under the umbrella of NATO, when and where required (!)[946], as the 'new normal' in NATO's deterrence and defence posture, the 1999 NATO Strategic did not change much to that. Again, by reflecting the politico-military context of the late 1990s that foresaw major operations in out-of-area format (i.e., outside NATO member states' territory), the language in the 1999 document was adjusted accordingly.

> "[…] **overall size of the Allies' forces** will be kept at the **lowest levels consistent with the requirements of collective defence** and other Alliance missions. […] the **peacetime geographical distribution of forces** will ensure a **sufficient military presence throughout the territory of the Alliance**, including the stationing and deployment of forces outside home territory and waters and forward deployment of forces when and where necessary" (1999 NATO Strategic Concept)[947]

The essence of NATO, principally the possibility of an invocation of Article 5 in case of an attack on a NATO member state, was, however, not questioned, but rather reiterated.

> "With respect to **collective defence** under **Article 5** of the Washington Treaty, the **combined military forces of the Alliance** must be **capable of deterring any potential aggression** against it, of **stopping an aggressor's advance as far forward as possible should an attack nevertheless occur**, and of ensuring the political independence and territorial integrity of its member states." (1999 NATO Strategic Concept)[948]

NATO's member states further agreed upon the nature of the armed conflict that they might fight as part of an Article 5 operation.

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[944] Compare paragraph 10, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022); with paragraph 20, subparagraph I.-IV., in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).

[945] Davis, C. (2010): NATO's Next Strategic Concept: How the Alliance's New Strategy will Reshape Global Security, pp. 36 f.

[946] See paragraph 45 a) and b), in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).

[947] See paragraph 53a) and b), in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).

[948] See paragraph 41, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).

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> "[…] **terminate war rapidly by making an aggressor** reconsider his decision, **cease his attack and withdraw**." (1999 NATO Strategic Concept)[949]

Considering that an aggressor might deploy considerable conventional and potential nuclear military capabilities, a rapid repulsion of an attack might only be possible if NATO employs sufficiently large conventional forces (and if the U.S. as nuclear-armed defender is reliable in terms of the use of nuclear weapons under specific conditions as agreed by NATO).

Furthermore, and interestingly enough, the implications of the first NATO Eastern enlargement for NATO's deterrence and defence posture were not highlighted in the 1999 NATO Strategic Concept at all. While it is obvious that the above statements were made without discrimination to the accession dates of the individual NATO member states, a number of questions remained unanswered. One such question might have been the defence of Hungary, which did not have any border to a NATO ally (e.g., Slovakia, Slovenia, and Romania were just acceding NATO in 2004, while Croatia followed only in 2009). Poland did have a border to NATO ally (re-united) Germany, but also employed an exposed border to the Russian Kaliningrad *oblast*.

With the 1999 NATO Eastern enlargement, a total area of around 483.000 sq. km (Poland: ~312.000 sq. km[950]; Hungary: ~93.000 sq. km[951]; Czech Republic: ~78.000 sq. km[952]) became NATO territory, which was considerably larger than the size of reunited Germany (~375.000 sq. km[953]). While not a high-level strategic document *per se*, the official 1995 Study on NATO Enlargement provided some indirect nuances on NATO's politico-military strategic thinking in regard to the alliance's deterrence and defence posture in view of the enlarged NATO territory.

> "In 1991, the Strategic Concept stated, "The threat of a simultaneous, full-scale attack on all of NATO's European fronts has effectively been removed ....". Since then, the **risk of a re-emergent large-scale military threat has further declined**." (1995 Study on NATO Enlargement)[954]

[949] See paragraph 47, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).
[950] CIA World Factbook (2023): Poland - Geography, Hyperlink: https://www.cia.gov/the-world-factbook/countries/poland/#geography (Last visit: 05.02.2023).
[951] CIA World Factbook (2023): Hungary - Geography, Hyperlink: https://www.cia.gov/the-world-factbook/countries/hungary/#geography (Last visit: 05.02.2023).
[952] CIA World Factbook (2023): Czechia - Geography, Hyperlink: https://www.cia.gov/the-world-factbook/countries/czechia/#geography (Last visit: 05.02.2023).
[953] CIA World Factbook (2023): Germany - Geography, Hyperlink: https://www.cia.gov/the-world-factbook/countries/germany/#geography (Last visit: 05.02.2023).
[954] See paragraph 10, in: NATO (1995): Study on NATO Enlargement, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_24733.htm (Last visit: 11.01.2023).

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In this sense, NATO's assessment of the basic geopolitical environment in the mid-1990s had been rather beneficial for a potential NATO enlargement due to the low risk of a larger inter-state war in the Euro-Atlantic region.

> "NATO **must ensure** that **all Alliance military obligations**, particularly those **under Article 5**, will be **met in an enlarged Alliance**. This will require a **case-by-case assessment of the military factors**, including **preparation time for NATO** to take on **new Article 5 commitments**, for **each prospective new member**, […]" (1995 Study on NATO Enlargement)[955]

Regardless of the political conditions that might lead to an enlargement, the transatlantic alliance was reminded of its core responsibility to guarantee an adequate deterrence and defence posture, especially when the alliance would grow in size through new member states.

> "[…], the **redeployment of existing Allied forces** from their current locations or the prepositioning of equipment would be **expensive**. There also is a **risk** that it could give a **misleading impression of Alliance concerns**." (1995 Study on NATO Enlargement)[956]

In regard to the key factor examined in this part of the subchapter 4.4.2.3 that includes the implications from the first post-Cold War era NATO enlargement, NATO's member states were sensitive towards any attempts of mirroring a forward deployment akin to the one of the Cold War. In view of the benefits of the end of the Cold War that enabled most countries of the Euro-Atlantic region to cut their national defence expenditures considerably, a costly deployment was not in the member states' interest because it could emit the wrong signals to other neighbouring non-NATO third states (i.e., particularly Russia) of the transatlantic alliance's intentions.

> "Decisions on the **stationing of Allies' conventional forces on the territory of new members** will have to be **taken by the Alliance** in the light of the **benefits both to the Alliance** as a whole and to particular **new members**, the **military advantages** of such a presence, the **Alliance's military capacity for rapid and effective reinforcement**, the **views of the new members concerned**, the **cost of possible military options**, and the **wider political and strategic impact**." (1995 Study on NATO Enlargement)[957]

Nevertheless, NATO reserved itself the option for further forward deployment in view of the politico-military context at the time. Subsequently, NATO would only decide on the deployment of significant numbers of allied troops in the new NATO member states a after

[955] See paragraph 44, in: NATO (1995): Study on NATO Enlargement, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_24733.htm (Last visit: 11.01.2023).
[956] See paragraph 53, in: NATO (1995): Study on NATO Enlargement, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_24733.htm (Last visit: 11.01.2023).
[957] See paragraph 54, in: NATO (1995): Study on NATO Enlargement, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_24733.htm (Last visit: 11.01.2023).

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careful consideration of the advantages and disadvantages, e.g., through examining the political as well as military implications for the transatlantic alliance and its individual member states.

If the 1999 NATO Strategic Concept is understood in conjunction with the not as highly endorsed 1995 Study on NATO Enlargement, NATO's Eastern enlargement was first and foremost not a central challenge for the alliance's deterrence and defence posture in terms of potential Article 5 operations in order to actually fend of a third state aggression. Nevertheless, it was made clear that a permanent forward deployment, such as the one that the U.S. conducted in Germany and Italy, was not foreseen as part of the enlargement process or thereafter. It became an option for a later time, if the politico-military conditions had changed so dramatically that it warranted a more persistent military presence in the new member states' territories.

Retain a minimum of military capabilities required for NATO Art. 5 missions:

In view of the obligations of Article 5 of the North Atlantic Treaty that each member state has vis-à-vis their allies, the question of a credible deterrence and defence posture remained dependent on national military forces.

> "To protect peace and to prevent war or any kind of coercion, the Alliance will **maintain** for the foreseeable future **an appropriate mix of nuclear and conventional forces based in Europe** and kept up to date where necessary**,** although **at a minimum sufficient level**." (1999 NATO Strategic Concept)[958]

The analytical instrument that tested the contributions of the individual member states to NATO has been the comparison of defence expenditures per GDP and armed forces quantities for each member state at the time of the 'stock-taking' of this subchapter (2001, see Table 58). It provides a quick overview on the differences in two essential input factors for determining the credibility of NATO's deterrence and defence posture, including its performance in comparison to Russia and those NATO member states that were not members by the time of the previous timeframe under analysis (1992).

	Def. exp. per GDP in percentage		*Difference*	*Armed Forces (in thousand)*		*Difference*
	2001	***1992***		***2001***	***1992***	
Belgium	1,28	1,83	-30,1%	39	79	-50,6%
Czech Republic	1,75	[--]	[--]	59	[--]	[--]
Denmark	1,53	1,89	-19,0%	21	28	-25,0%
France	2,03	2,69	-24,5%	374	522	-28,4%
Germany	1,32	1,86	-29,0%	308	442	-30,3%
Greece	3,25	3,63	-10,5%	163	208	-21,6%
Hungary	1,57	[2,18%]	[-28,0%]	48	[78]	[-38,5%]

[958] See paragraph 46, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).

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Iceland	N/A	N/A	N/A	N/A	N/A	N/A
Italy	1,68	1,75	-4,0%	483	471	+2,5%
Luxembourg	0,68	0,83	-18,1%	2	1	+100%
Netherlands	1,44	2,21	-34,8%	56	90	-37,8%
Norway	1,70	2,96	-42,6%	27	36	-25,0%
Poland	1,91	[2,23%]	[-14,3%]	228	[270]	[-15,6%]
Portugal	1,91	2,39	-20,1%	90	80	+12,5%
Spain	1,63	2,04	-20,1%	215	198	+8,6%
Turkey	3,60	3,87	-7,0%	665	704	-5,5%
UK	2,41	3,86	-37,6%	211	293	-28,0%
NATO-Europe	**1,86 (av)**	**2,45 (av)***	**-24,0%**	**2.990 (sum)**	**3.152 (sum)***	**-5,1%**
Canada	1,14	1,86	-38,7%	66	82	-19,5%
U.S.	3,12	4,97	-37,2%	1.421	1.920	-26,0%
NATO total	**1,89 (av)**	**2,58 (av)***	**-26,6%**	**4.476 (sum)**	**5.154 (sum)***	**-13,2%**
Russia	*3,55*	*4,43*	-19,9%	*1.386*	*1.900*	*-27,1%*

** The numbers in [brackets] were not included in the average of def. exp/GDP and sum calculations for the Armed Forces quantities of NATO-Europe/NATO total.*

Table 62: Defence expenditures/GDP and Armed Forces personnel numbers in comparison, 2001<->1992[959]; with arithmetic average (av) of defence expenditures and sum of armed forces [own presentation]

In contrast to the initial post-Cold War era that covered the very short period between 1990 and 1992, the timeframe under consideration in this subchapter (1992-2001) is considerably longer and the difference between the numbers and quantities provided in Table 58, therefore are logically expected to be larger as well.

For the 16 NATO countries that were already member states of the alliance in 1992, a percentual 'double-digit' decrease from 1992 to 2001 is identifiable for almost every national defence expenditure per GDP. While no positive defence expenditure growth occurred in any state, the defence budget shrank comparatively little in Italy and Turkey. Overall arithmetic averages of the NATO-Europe and NATO-total defence expenditures showed a fall below the two-percent mark[960]. While the new NATO member states Poland, Hungary and Czech Republic were not members in 1992, their defence expenditures at the time were taken as a point of reference for the defence expenditure changes in NATO's member states. The decrease in Hungary's defence expenditures from 1992 to 2001 (-28 percent) is not untypical in comparison to the Germany

[959] SIPRI (2022): SIPRI Military Expenditure Database, Hyperlink: https://milex.sipri.org/sipri (Last visit: 23.12.2022); and :Armed Forces data derived from: WorldBank (2022): Armed forces personnel – total, Hyperlink: https://data.worldbank.org/indicator/MS.MIL.TOTL.P1 (Last visit: 08.01.2022).

[960] The implications of the two-percent defence expenditure goal of NATO for Germany was discussed in further detail in: Kamp, K.-H. (2019): Myths Surrounding the Two Percent Debate – on NATO defence spending, pp. 1-5, Hyperlink: https://www.baks.bund.de/sites/baks010/files/working_paper_2019_9.pdf (Last visit: 01.08.2022).

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as one of the closest NATO members (-29 percent), while Poland's decrease is relatively modest (-14,3 percent).

Considering for further reference Russia in its role of the challenger in the integrated conventional/nuclear deterrence game, its decrease (-19,9 percent) was similar to that of Denmark, Portugal, and Spain. A NATO-Europe/NATO-total-to-Russia comparison reveals that Russia has kept the relative pole position regarding the smallest decrease, while the decrease in NATO-total defence expenditures in comparison to the NATO-Europe result is relatively higher due to the larger drop in the U.S. and Canada's defence expenditures.

In regard to the armed forces quantities, a percentual 'double-digit' decrease from 1992 to 2001 is identifiable for the vast majority of the 16 NATO members. Notable exemptions of this trend are Italy with a slight increase (+2,5 percent), a larger increase in Spain (+8,6 percent), and a considerably larger increase in Portugal (+12,5 percent). The growth in Luxembourg's armed forces represents an 'calculation' artefact because of the country's generally small size of the armed forces and a rounding factor. Taking the further non-NATO member states of 1992 that eventually were members in 2001 into account, Hungary's decrease in military personnel numbers (-38,5 percent) is comparable to that of the Netherlands (-37,8 percent) and thereby at the upper end of NATO's percentual decreases in national armed forces. In contrast, Poland's drop in numbers (-15,6 percent) is at the lower end in comparison to other individual NATO member states' personnel decreases.

Comparing Russia's decrease of its armed forces size (-27,1 percent) to the decreases in individual NATO member states, it is similar to the one in France (-28,4 percent) or the UK (-28 percent) and slightly higher than in the U.S. (-26 percent).

Surprisingly, the comparison between NATO-Europe and NATO-total moves NATO-Europe in a better relative position because the combined NATO member states in Europe has cut their military to a lesser extend in comparison to the reference year 1992 (-5,1 percent) than NATO-Total (-13,2 percent) that includes major cuts in armed forces personnel in the U.S. and Canada.

	2001	***1992***	***Difference***
U.S. Military Personnel Forward Deployment to Europe (in thousand)	111	183	-39,3%

Table 63: U.S. military personnel in Europe, comparison 2001 <-> 1992[961]

[961] Statista (2022): Number of United States military personnel in Europe from 1950 to 2021, Hyperlink: https://www.statista.com/statistics/1294309/us-troops-europe/ (Last visit: 05.06.2022).

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With a view to NATO's primary forward deployed forces, which came from the U.S. (-39,3 percent), the decrease in personnel numbers in percentage also exceed the decreases in the continental U.S. armed forces by far (-26 percent) (see Table 59.

The situational picture of NATO's decreases in both defence expenditures per GDP and armed forces personnel has also been noticed by the International Staff of NATO that compiled a 1990-to-1997 comparison of NATO's overall forces in percentage. Table 64 provides these numbers per military branch, including miscellaneous information.

Branches and activities of NATO's Deterrence and Defence Posture	*NATO force availability reduction (1997 in comparison to 1990) by*
Land Forces	- 35 %
Maritime Forces	- 32 %
Air Forces	- 41 %
Military Personnel	- 24 %
Defence Expenditures	- 22 %
Forward Stationing of Forces	- 2/3 reduction of forward deployed land formations in Western Germany; - 2/3 reduction of military personnel in Western Germany; - 70 % reductions of forward stationed aircraft U.S. forces in Europe reduced from 300.000 to 100.000 military personnel
Nuclear Weapons	- 80 % land-based weapons and further reductions in tactical air-delivered bombs (nuclear-sharing) + reductions in strategic nuclear weapons
Military Exercises	Focus on more generic crisis-management and peacekeeping exercises, including combined exercises with Partnership for Peace (PfP) Partners

Table 64: The Transformation of NATO's Defence Posture in 1997 (before the 1999 NATO Eastern enlargement)[962]

At this point, the information from Table 58 represents only a demonstrative snapshot in order to highlight those considerable decreases in NATO's overall capabilities also led to a decrease in the overall credibility of NATO's deterrence and defence posture.

In reaction to these changes, the heads of state and government of NATO's member states understood that joint action was required to align the decrease in the military capabilities with the post-Cold War era military tasks, especially in view of the requirements derived from the non-Article 5 operations. In order to tackle this divide from a capability point of view, NATO launched the Defence Capability Initiative (DCI) in 1999.[963]

[962] NATO (1997): The Transformation of NATO's Defence Posture, Hyperlink: https://www.nato.int/docu/comm/1997/970708/infopres/e-defpost.htm (Last visit: 12.12.2022).
[963] NATO (1999): Defence Capabilities Initiative, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27443.htm (Last visit: 05.02.2023).

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At the 2002 NATO summit in Prague, the heads of state and government launched a DCI follow-on initiative, namely the Prague Capabilities Commitment (PCC).[964]

While the basic intention of these military capability development activities, upon which all NATO member states mutually agreed, had been ambitious, their implementation lacked considerable progress in terms of adequate resourcing and eventual output.[965] While there is only limited public information available about the details of NATO military capability development, the key challenges that NATO's jointly agreed capability requirements needed to address were strongly focussed on either specialised topics (e.g. chemical, biological, radiological, and nuclear defence), interoperability-related (e.g. deployable command, control, and communication), or connected with out-of-area operations (e.g. strategic air- and sealift).[966] Naturally, those capabilities would also be beneficial to military forces that operate on the basis of Article 5 of the North Atlantic Treaty in a high-intensity and technology-driven inter-state war, but those capabilities could not replace the pure materiel existence of large military formations needed in order to fight a symmetric state opponent. Therefore, and in a nutshell, NATO's member states continued on the track of reducing substantial military capabilities after a decade of the post-Cold War era.

Increase reliance on multinational forces and NATO's command structure:

The follow-on timeframe of the first decade of the post-Cold War era saw further turmoil in the Euro-Atlantic region and beyond, particularly in the Middle East and Afghanistan, in response to the pressing issue of a globalised radical Islamic terrorism. This had hit NATO' key ally, the U.S., on its own territory at 11. September 2001. The result was, *inter alia*, that NATO became ever more active in crisis management operations of various scale, such as NATO's military intervention in Libya, prolonged support to ISAF and its successor Resolute Support in Afghanistan, or NATO maritime operations Active Endeavour and anti-piracy operation in the Gulf of Aden;[967] last but not least: the first Article 5 operation Eagle Assist[968] in order to support the U.S. with air surveillance capabilities).

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[964] See paragraph 4 c., in: NATO (2002): Prague Summit Declaration, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_19552.htm (Last visit: 05.02.2023).

[965] Schnaubelt, C. (2011): NATO's New Strategic Concept: Implications for Military Transformation and Capabilities, pp. 146 f. In: *Ringsmose, J./Rynning, S. (eds.): NATO's New Strategic Concept: A Comprehensive Assessment, DIIS, Report, no. 2, 2011*.

[966] NATO (2011): Prague Capabilities Commitment (PCC) (Archived), Hyperlink: https://www.nato.int/cps/en/natolive/topics_50087.htm (Last visit: 05.02.2023).

[967] NATO (2022): Operations and missions: past and present, Hyperlink: https://www.nato.int/cps/en/natohq/topics_52060.htm (Last visit: 18.10.2022).

[968] NATO (2022): Collective defence and Article 5, Hyperlink: https://www.nato.int/cps/en/natohq/topics_110496.htm (Last visit: 18.10.2022).

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In view of the variation in NATO's missions and operations, particularly those non-Article 5 related ones, the transatlantic alliance's deterrence and defence posture in accordance with the 1999 NATO Strategic Concept remained within the NATO LoA that was already formulated in the 1991 edition of the concept[969].

> "The Alliance's ability to **accomplish the full range of its missions** will **rely increasingly on multinational forces**, **complementing national commitments to NATO for the Allies concerned**. Such forces, which are applicable to the full range of Alliance missions, **demonstrate the Alliance's resolve** to maintain a **credible collective defence**; enhance Alliance cohesion; and reinforce the transatlantic partnership […]." (1999 NATO Strategic Concept)[970]

In order to establish a common understanding of NATO's force requirements, the 1999 NATO Strategic Concept went into some detail of the alliance's force posture.[971]

As an integral part of NATO's deterrence and defence posture, the requirements for the NFS and NCS as established in the 1991 concept were perpetuated[972], *albeit* with novelty in regard to the challenge of rapid deployable headquarters for missions and operations in out-of-area regions away from NATO member states' territories.

> "**Multinational forces**, particularly those **capable of deploying rapidly for collective defence or for non-Article 5 crisis response operations**, reinforce **solidarity**. They can also provide a way of deploying **more capable formations than might be available purely nationally**, thus helping to make more efficient use of scarce defence resources. This may include a highly **integrated, multinational approach** to specific tasks and functions, an approach which underlies the **implementation of the CJTF concept**." (1999 NATO Strategic Concept)[973]

The CJTF *or* Combined Joint Task Force concept was a NATO idea from the mid-1990s that intended to provide the alliance with a rapidly deployable, multi-branch, multinational headquarters for out-of-area operations beside the traditional NCS.[974] Originally derived from a U.S. concept, the implementation of the CJTF had a decisive influence on how NATO's forces were jointly operating outside NATO territory. In concurrence with the development of non-Article 5 operational capabilities, the structural adaption of the NCS to include the CJTF as a

[969] See paragraph 53, in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).
[970] See paragraph 61, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).
[971] See paragraphs 47-64, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).
[972] See paragraph 53, in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).
[973] See paragraph 61, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).
[974] NATO (1999): The Combined Joint Task Forces concept, Hyperlink: https://www.nato.int/docu/comm/1999/9904-wsh/pres-eng/16cjtf.pdf (Last visit: 05.02.2023).

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flexible and tailored command and control entity for military formations in non-Article 5 missions and operations did not contribute much to NATO's original Article 5-related deterrence and defence posture.[975]

In regard to the NCS and NFS development, the provisions of the 1999 NATO Strategic Concept were quite quickly overshadowed by the 2002 NATO summit in Prague, wherein the heads of state and government agreed on a number of far-reaching initiatives related to the operational use of NATO's forces outside NATO territory (together with their implications for military capability development see in subchapter 4.4.2.3).

> "NATO will no longer have the **large, massed units** that were **necessary for the Cold War**, but will have **agile and capable forces at Graduated Readiness levels** that will **better prepare the Alliance to meet any threat** that it is likely to face in this **21st century**." (SACEUR General James Jones (2002))[976]

To name just one example, the NFS was considerably strengthened by the establishment of the NATO Response Force (NRF), which was planned as a rapid, flexible and multi-domain military formation for full operational use by 2006.[977] Structurally, the NRF consisted of three parts: A headquarters function, the actual core military force formation with a size of around 13.000 military personnel from different branches, and a force pool for supplementing the core formation. Furthermore, troop contributions from the NATO allies were to be provided on a six-month rotational basis, thus requiring every member state to contribute force once in a while. The land component of the NRF encompassed a brigade-sized formation, the maritime component was represented by contributions from the Standing NATO Maritime Group (SNMG) and the Standing NATO Mine Countermeasures Group (SNMCMG), while the air component included flexible fighter and transport aircraft, attack helicopters and transport rotary-wing crafts.[978] While the initial role of the NRF had been rather limited to non-Article 5 operations, it evolved into the baseline of the NFS that eventually became the central component of NATO's deterrence and defence posture.[979]

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[975] Barry, C. (1997): The NATO CJTF Command and Control Concept, pp. 29-36. In: *Young, T.-D. (ed.): Command in NATO After the Cold War: Alliance, National, and Multinational Considerations, 1997*, Hyperlink: https://apps.dtic.mil/sti/pdfs/ADA365666.pdf (Last visit: 05.02.2023).

[976] NATO (2022): NATO Response Force, Hyperlink: https://www.nato.int/cps/en/natohq/topics_49755.htm (Last visit: 05.02.2023).

[977] See paragraph 4 a., in: NATO (2002): Prague Summit Declaration, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_19552.htm (Last visit: 05.02.2023).

[978] European Parliament (2014): NATO Response Force, pp. 1-4, Hyperlink: https://www.europarl.europa.eu/meetdocs/2014_2019/documents/sede/dv/sede240914natoresponseforcecomplete_/sede240914natoresponseforcecomplete_en.pdf (Last visit: 05.02.2023).

[979] BMVg (2022): New Force Model: Wie Deutschland sich ab 2025 in der NATO engagiert, Hyperlink: https://www.bmvg.de/de/aktuelles/new-force-model-wie-deutschland-sich-ab-2025-in-nato-engagiert-5465714 (Last visit: 05.02.2023).

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Retain a minimum NATO tactical nuclear deterrent:

In regard to NATO's non-strategic nuclear deterrence, which required NATO member states to retain dual-capable aircraft for delivering the B61 nuclear gravity bombs, forward located in U.S. vaults in NATO allied territories, the 1999 NATO Strategic Concept restricted itself to taking stock of the achievements in downshifting of the quantities in these stockpiles in Europe in addition to some qualitative changes (e.g., reducing readiness or ending nuclear contingency planning).

> "**Since 1991**, therefore, the Allies have taken a series of steps which reflect the post-Cold War security environment. These include a **dramatic reduction of the types and numbers of NATO's sub-strategic forces** including the **elimination of all nuclear artillery and ground-launched short-range nuclear missiles**; a significant relaxation of the **readiness criteria for nuclear-roled forces**; and the **termination of standing peacetime nuclear contingency plans**." (1999 NATO Strategic Concept)[980]

Still, NATO's member states were not willing to discard the retention of non-strategic nuclear weapons despite their limited usage in the politico-military situation at the time.

> "**NATO's nuclear forces no longer target any country**. Nonetheless, NATO will **maintain, at the minimum level** consistent with the prevailing security environment, **adequate sub-strategic forces based in Europe** which will provide an **essential link** with **strategic nuclear forces**, reinforcing the transatlantic link. These will consist of **dual capable aircraft** and a small number of **United Kingdom Trident warheads**. **Sub-strategic nuclear weapons** will, however, **not be deployed in normal circumstances on surface vessels and attack submarines**." (1999 NATO Strategic Concept)[981]

An exemption from the nuclear commitment by NATO's member states came from Greece that decided not to replace their obsolete dual-use aircraft by 2001. Regardless of the Greek national decision, the country continued to support NATO's general nuclear defence planning, inter alia, through the Nuclear Planning Group.[982] The individual country's role as well as the one of the UK, which was mentioned in the 1999 NATO Strategic Concept, are examined in more detail from a capability perspective in subchapter 4.4.3.6.

U.S. strategic nuclear forces remain supreme security guarantee:

[980] See paragraph 64, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).
[981] See paragraph 64, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).
[982] Institut Montaigne (2021): Weapons of Mass Debate - Greece: a Key Security Player for both Europe and NATO, Hyperlink: https://www.institutmontaigne.org/en/analysis/weapons-mass-debate-greece-key-security-player-both-europe-and-nato (Last visit: 01.02.2023).

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Lastly, as highlighted in the 1991 NATO Strategic Concept[983], the 1999 document reiterated the consensus of all NATO member states on the issue of strategic nuclear weapons through the perpetuation of the same text bloc:

> "The **supreme guarantee of the security** of the Allies is provided by the **strategic nuclear forces** of the Alliance, particularly those **of the United States**; the **independent nuclear forces** of the **United Kingdom and France**, which have a deterrent role of their own, **contribute to the overall deterrence** and security of the Allies." (1999 NATO Strategic Concept)[984]

Given that the question of NATO's sub-strategic nuclear policy was addressed in the previous part of this subchapter and the U.S. extended nuclear deterrence for the time after the first decade of the post-Cold War is described in subchapter 4.5.2.3, there is no further need to discuss this topic at this point. In a nutshell, the 1995 Study on NATO Enlargement underlined the practical perception of nuclear deterrence being a public good because additional new members would not lead to new requirements to be fulfilled by NATO's nuclear powers.[985]

Based on the operationalised criteria that determine the specific posture for the NATO member states 'collective' (protégé plus defender) in the integrated conventional/nuclear deterrence game at a discrete time, the analysis of the 1999 NATO Strategic Concept leads to the following result.

Following the application of the four operational indicators in Table 59 of subchapter 4.4.2.1 on the 1999 NATO Strategic Concept, the NATO 'collective' employed a 'soft deterrence and defence posture in the initial-Cold War era (excluding the U.S. extended nuclear deterrence for NATO which is separately addressed in subchapter 4.5).

The individual results from the evaluation of the four indicators were the following:

(1) *Limit/remove a forward presence in allied member states' territory with exposed borders (soft)*:

Within the remit of 1997 NATO-Russia Founding Act (see subchapter 4.2.5), the sixteen member states that were part of the transatlantic alliance since the end of the Cold War committed themselves to provide Russia with military security guarantees that, *inter alia*, principally excluded any deployment of Western nuclear weapons. Furthermore, NATO reassured Russia that it would execute any duties within the remit of NATO's mandate given by the member states with preparations for potential reinforcements instead of the

[983] See paragraph 54, in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022).
[984] See paragraph 62, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).
[985] See paragraph 57, in: NATO (1995): Study on NATO Enlargement, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_24733.htm (Last visit: 11.01.2023).

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permanent stationing of troops in the newly acceded member states' territories. In essence, NATO accepted NATO's first Eastern European member states under caveats that were supposed to accommodate Russian security interests and Russia agreed to the NATO enlargement in exchange.

(2) *No or limited definition of generalised military capability requirements pertaining to the tasks of the military alliance (soft)*:

Taking into account that the 1999 NATO Strategic Concept was drafted at a time when NATO conducted military operations beyond its own territory (out-of-area) and under non-Article 5 conditions (e.g., practically all kinds of crisis management operations) for the first time since its foundation, the tasks for NATO's deterrence and defence posture lied in the member states' commitment to contribute troops and military capabilities to NATO's operations. After the first lessons learned from the interventions on the Balkans, NATO-Europe acknowledged that it was missing critical capabilities, e.g., more flexible and rapidly deployable smaller force formations with air and maritime support. Against this backdrop, the prioritisation of NATO's member states and subsequently of NATO itself began to shift away from classical deterrence around the turn of the millennium. This situation aggravated after the U.S. came under attack in the 9/11 terrorist attacks of 2001 and regardless of the first invocation of Article 5 in the history of NATO, the central challenge seen and accepted by NATO was predominantly the one's caused by non-state actors and potentially rogue states.

(3) *Establish multinational formations as favoured part of military alliance's deterrence and defence posture (soft)*:

In view of the increasing political and occasionally military instability at NATO's periphery and in adjacent regions, e.g., the Balkans, the Middle East, Afghanistan and North Africa as well as piracy on highly traversed waterways (Horn of Africa), made NATO's member states thinking about the adequacy of their NATO Command and Force Structure. While NATO still relied on individual member states' force commitments, the post-Cold War draw-downs together with the new operational environments with their subsequent military requirements that many European NATO allies did not see coming at the time of the Cold War forced NATO to reorient its own defence planning focus.

(4) *Decrease/limit the nuclear dimension of the military alliance's deterrence and defence posture (soft)*:

In regard to NATO's nuclear deterrence, the U.S. and Russia continued upon a course of nuclear disarmament based on the 1991 START I Treaty, while the 1993 START II Treaty

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was still not ratified at the time of the 1999 NATO Strategic Concept. In addition, the U.S. has further decreased its non-strategic nuclear arsenal between 2001 and 2006 by 85 percent which meant an additional considerable downshift of NATO's reliance on this type of nuclear weapon.[986]

4.4.2.4 NATO's deterrence and defence posture after the second decade of the post-Cold War era

With the adoption of the 2010 NATO Strategic Concept, the transatlantic alliance embarked upon a journey that reflected the increased role of NATO in trans-regional crises (e.g., through its operations in Afghanistan or Iraq) and in tackling global challenges (e.g., international terrorism or the proliferation of nuclear and missile technology). At the same time, and with former Danish prime minister and then-Secretary General Anders Fogh Rasmussen at the helm of the alliance, NATO's strategic concept became more political in its strategic communication of its basic tenets and intentions towards member states and the wider public as well.[987]

Whereas previous iterations of NATO's strategic concept have been going into more depth regarding the topic of deterrence and its requirements for the alliance's conventional and nuclear forces, the latest examined iteration in the format of the 2010 NATO Strategic Concept remained relatively 'light and general' in its references to deterrence, which is also reflected in Figure 16 below.

As an addition to NATO's strategic concept, which was adopted at the NATO's Lisbon summit in November 2010, the heads of state and government agreed to return to the open matters that the member states of the transatlantic alliance could not fully solve within the scope of the 2010 NATO Strategic Concept (e.g., the role of NATO's nuclear deterrent beyond the established wording or the scope of NATO's ballistic missile defence). As a consequence, one further summit outcome was the tasking of the North Atlantic Council (NAC) to prepare a Deterrence and Defence Posture Review (DDPR) ahead of the planned next 2012 NATO summit in Chicago.[988]

The NATO DDPR was publicly released in May 2012 and provides important operational details on the conventional and nuclear forces that contribute to NATO's deterrence and

[986] Credi, O. (2019): US Non-Strategic Nuclear Weapons in Europe: Necessary or Obsolete?, pp. 1 f.. Hyperlink: https://www.jstor.org/stable/resrep19821 (Last visit: 13.02.2023).
[987] Ringsmose, J./Rynning, S. (2011): Introduction. Taking Stock of NATO's New Strategic Concept, pp. 14 f. In: *Ringsmose, J./Rynning, S. (eds.): NATO's New Strategic Concept: A Comprehensive Assessment, DIIS, Report, no. 2, 2011*.
[988] Thränert, O. (2011): NATO's Deterrence and Defense Posture Review, pp. 1-4, Hyperlink: https://www.swp-berlin.org/publications/products/comments/2011C34_trt_ks.pdf (Last visit: 07.02.2023).

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defence posture as well as the further added value by missile defence systems.[989] As a consequence, the 2012 NATO DDPR is an additional source of information, which is used throughout this subchapter to enrich the analysis of the 2010 NATO Strategic Concept in accordance with the empirical analytical instrument that was introduced in subchapter 4.1.2.1.

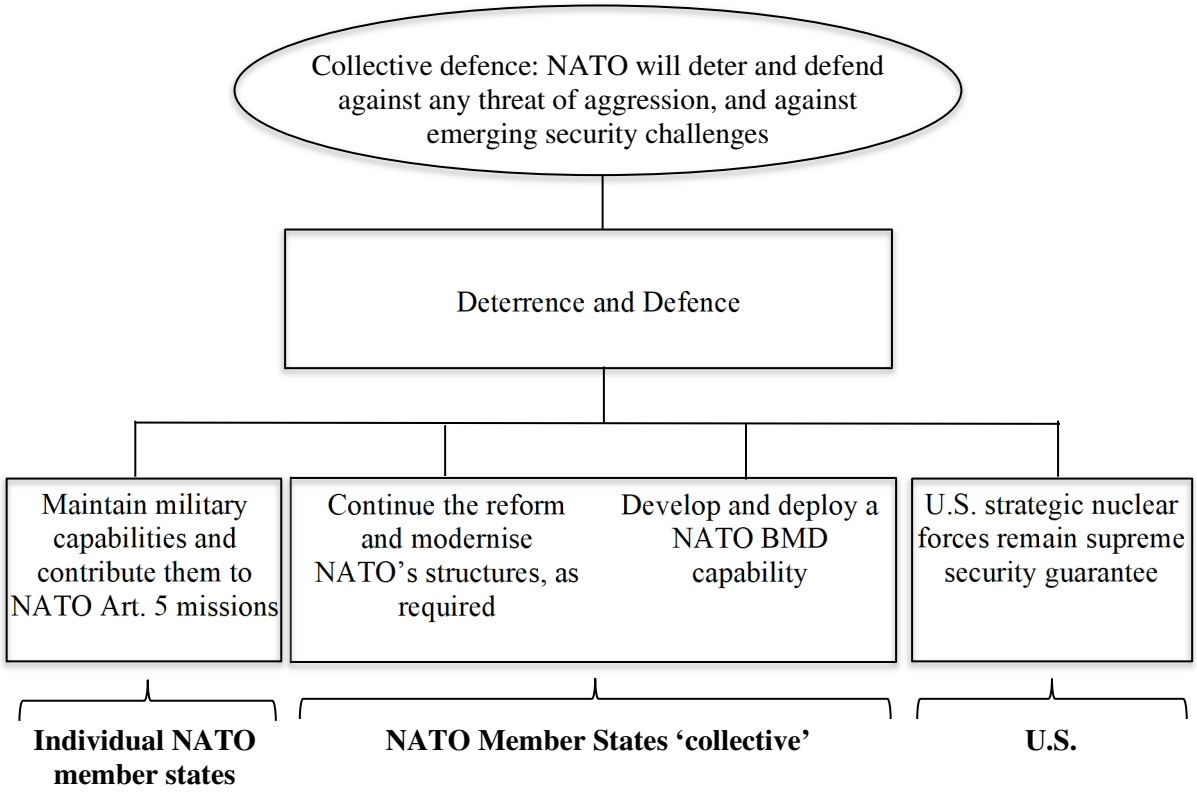

Figure 16: Top-Down definition of NATO's post-cold War deterrence and defence posture derived from the 2010 NATO Strategic Concept [own illustration]

The 2010 NATO Level of Ambition (LoA):

By 2010, the transatlantic alliance has just been enlarged to the total of 28 member states by accepting Albania and Croatia in the preceding year.[990] Furthermore, in view of the rough road that NATO had been on in the decade since the last 1999 NATO Strategic Concept that included the first Article 5 operation of NATO in the wake of the 9/11 terrorist attacks on the U.S. in 2001, the continuous NATO Mission in Kosovo (KFOR) on the Balkans, the ongoing quagmire of the Western military presence in Afghanistan, as well as a political fallout from the deep intra-alliance divide inside Europe and between Europe and the U.S. over the support or non-support of the 2003 U.S. invasion in Iraq, a new common strategy was long overdue. In view of the inclusiveness of the document's drafting process, which included a wide range of

[989] As a general reference, see: NATO (2012): Deterrence and Defence Posture Review, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_87597.htm (Last visit: 10.01.2023).
[990] NATO26 + Albania, Croatia, (2009 and earlier) See: NATO (2022): Member countries, July 2022, Hyperlink: https://www.nato.int/cps/su/natohq/topics_52044.htm?selectedLocale=en (Last visit: 26.08.2022).

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participants from the member states' diplomatic corps, military, external experts, etc., the document departed to a certain extent from the previous two strategic concepts. It rebalanced some content that was too much oriented to NATO's military operations at the time.[991]

One such rebalancing efforts touched upon the core tenets of NATO's existence, namely deterrence and defence, which was handily described as 'collective defence' in the 2010 NATO Strategic Concept and moved back to the prime position regarding NATO's core tasks[992].

> "**Collective defence**. NATO members will always **assist each other against attack**, in accordance with **Article 5 of the Washington Treaty**. That commitment remains firm and binding. **NATO will deter and defend against any threat of aggression**, and against emerging security challenges where they threaten the fundamental security of individual Allies or the Alliance as a whole." (2010 NATO Strategic Concept)[993]

Thus, the 2010 NATO LoA certainly provided a clearer politico-military vision, the key question for the alliance's member states was how this core task should be implemented.

To no small extend, the financial situation that many NATO member states were in at the time of the 2010 concept's inception had to be taken into account. Recalling the road to 2010, the disruptive financial crisis of autumn 2008 was still impeding on NATO's member states. Defence expenditures were one of those budget items that member state governments were willing to cut first if they did not perceive any immediate military threat to their country. Given that defence budgets were still in descent since the 1990s, the economic pressure to shift funding from the military to the social cushioning of the negative effects on the labour market was increasing over time with the ongoing duration of the financial crisis.[994] NATO's response was, at least to a certain extent, two-pronged:

> "NATO seeks its security at the **lowest possible level of forces**. **Arms control, disarmament and non-proliferation** contribute to peace, security and stability, and should **ensure undiminished security for all Alliance members**." (2010 NATO Strategic Concept)[995]

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[991] Kamp, K.-H. (2011): The Alliance after Lisbon: Towards NATO 3.0? pp. 168-172. In: *Ringsmose, J./Rynning, S. (eds.): NATO's New Strategic Concept: A Comprehensive Assessment, DIIS, Report, no. 2, 2011*.

[992] Compared to paragraph 20 with subparagraph III, in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022); and paragraph 10, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).

[993] See paragraph 4 a), in: NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', p. 7, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 03.12.2022).

[994] Hyde-Price, A. (2011): NATO's Political Transformation and International Order, pp. 51 f. In: *Ringsmose, J./Rynning, S. (eds.): NATO's New Strategic Concept: A Comprehensive Assessment, DIIS, Report, no. 2, 2011*.

[995] See paragraph 26, in: NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', p. 23, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 03.12.2022).

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Naturally, any efforts that would increase the alliance's and subsequently its member states' military security through international agreements and treaties with third states with stocks of nuclear and conventional weapons would be a cheaper solution than to actually spend money on the military. Nevertheless, the 2012 NATO DDPR remained steadfast in the alliance's demand by its member states in order to provide a sufficient level of military security, namely deterring an aggressor and defending alliance territory.

> "The **bulk of the conventional capabilities** that are available now and will be available in the future for Alliance operations are **provided by the Allies individually**; they must therefore **provide adequate resources for their military** forces so that they will have the required characteristics, notwithstanding **current and probably continuing financial difficulties**." (2012 NATO DDPR)[996]

In the same vein, then-Secretary General Rasmussen repeatedly stressed the importance that despite the impact of the financial crisis, member states should be highly aware that defence cuts were not to lead to further shortfalls in their military capabilities contributed to NATO's deterrence and defence posture.[997]

Deterrence and Defence:

When it comes to 'what is needed' by the transatlantic alliance in order to defend the territory of its member states as part of the 2010 NATO LoA, the singular point of reference are the quantitative and qualitative aspects of the military capabilities that member states contribute to the alliance.

> "We will ensure that NATO has the **full range of capabilities necessary to deter and defend against any threat** to the safety and security of our populations. Therefore, we will:
> - **maintain an appropriate mix** of **nuclear** and **conventional forces**;
> - **maintain the ability to sustain concurrent** major joint operations and **several smaller operations for collective defence and crisis response**, **including at strategic distance**;" (2010 NATO Strategic Concept)[998]

The operational duties for NATO member states' militaries that would be connected with a multi-directional threat vector, which was described as a "360-degree approach" since 2015, reflected a compromise between the Eastern flank that was mainly concerned with a more confrontative Russia (especially after the 2014 Russian annexation of Crimea), while the

[996] See paragraph 15, in: NATO (2012): Deterrence and Defence Posture Review, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_87597.htm (Last visit: 10.01.2023).
[997] NAOC (2010): Maxed Out: NATO and the Growing Debt Crisis, Hyperlink: https://natoassociation.ca/maxed-out-nato-and-the-growing-debt-crisis/ (Last visit: 07.02.2023).
[998] See paragraph 19 with the first two bullet points, in: NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', p. 15, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 03.12.2022).

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Southern flank mainly focussed on the threat from international terrorism and the issue of mass migration from adjacent Middle East, Afghanistan, and the African continent.[999]

> "The **Alliance does not consider any country to be its adversary**. However, no one should doubt NATO's resolve if the security of any of its members were to be threatened. **NATO will ensure** that it maintains the **full range of capabilities necessary to deter and defend against any threat** to the safety and security of our populations, **wherever it should arise**." (2012 NATO DDPR)[1000]

In order to ensure that NATO has the adequate capabilities available, the alliance's member states agreed to establish a sophisticated planning process, known as the NATO Defence Planning Process (NDPP). In it the various politico-military committees and working bodies should jointly identify the adequate types of military capabilities, including common funding resources, required for the defence of NATO's territory within the remit of Article 5 as well as the various requirements from non-Article 5 missions and operations. The identified requirements would then be disbursed among NATO's member states together with quantitative and qualitative benchmarks.[1001]

While such multinational defence planning was not a new aspect of NATO, it certainly evolved since the end of the Cold War. While in the 1990s, the important reference for the defence requirements for NATO's forces was still derived from Russia's military that represented a conventional and nuclear key force in Europe, the advent of crisis management operations in the Balkans as well as the out-of-area missions and operations after 9/11 were the real game changers for NATO's defence planning in the post-Cold War era. Given that the threat to NATO now became multi-dimensional, defence planning went from a threat-based to a capability-based planning. This brought several complex challenges on its own for national and NATO defence planners that had to juggle requirements for high-intensity warfare with a peer rival state as well as a low-intensity persistent forward deployed operation with asymmetric non-state terrorist groups.[1002]

In addition to the efforts that the individual NATO member states invested in their own military capabilities, they also agreed to pursue collaborative activities to supplement the national

[999] New Eastern Europe (2021): Is NATO's 360-degree approach enough to keep focus on the Eastern flank?, Hyperlink: https://neweasterneurope.eu/2021/06/22/is-natos-360-degree-approach-enough-to-keep-focus-on-the-eastern-flank/ (Last visit: 07.02.2023).

[1000] See paragraph 2, in: NATO (2012): Deterrence and Defence Posture Review, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_87597.htm (Last visit: 10.01.2023).

[1001] NATO (2022): NATO Defence Planning Process, Hyperlink: https://www.nato.int/cps/en/natohq/topics_49202.htm (Last visit: 22.07.2022).

[1002] Pfeiffer, H. (2008): Defence and Force Planning in Historical Perspective: NATO as a Case Study, pp. 111-120, Hyperlink: https://www.baltdefcol.org/files/files/documents/Research/5_%20Holger%20Pfeiffer-Defence%20and%20Force%20Planning%20in%20Historical%20Perspective-NATO%20as%20a%20Case%20Study.pdf (Last visit: 29.12.2022).

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efforts. In the previous subchapter 4.3.2.3., capability-related activities like the DCI and the PCC were already introduced. Since 2011, NATO had furthermore launched another initiative on a project-basis, known as Smart Defence. This initiative aimed at offering a joint framework to NATO's member states which ought to cooperate on capabilities that were required for NATO's deterrence and defence posture, and which desired to capitalise on the cooperation thanks to 'economies of scale' effects by having more than one ally contributing to a joint project.[1003]

Maintaining military capabilities and contributing them to NATO Art. 5 and non-Art. 5 missions:

Despite the challenge of a multi-dimensional threat perspective among NATO's members in conjunction with the negative impact of the 2008 financial crisis on individual member states' defence budgets, NATO had to press its members for adequate military contributions. Thus, the state of affairs regarding the defence expenditures and armed forces personnel levels per member state of the alliance played yet again a decisive role in the overall level of NATO's deterrence and defence posture.

Table 59 below provides an overview of the data from 28 NATO member states in 2010 with a comparison to their 2001 data. Considering that nine new members acceded the alliance between 2001 and 2010[1004], their respective data are included in the NATO-Europe and NATO total for 2010, but excluded in the 2001 NATO-Europe/NATO total numbers (hence, the numbers are put in brackets).

	Def. exp. per GDP in percentage		*Difference*	*Armed Forces (in thousand)*		*Difference*
	2010	***2001***		***2010***	***2001***	
Albania	1,56	[1,31]	[+19,1%]	15	[41]	[-63,4%]
Belgium	1,08	1,28	-15,6%	36	39	-7,7%
Bulgaria	1,65	[2,88]	[-42,7%]	65	[111]	[-41,4%]
Croatia	1,68	[2,70]	[-37,8%]	22	[68]	[-67,6%]
Czech Republic	1,19	1,75	-32,0%	29	59	-50,8%
Denmark	1,40	1,53	-8,5%	19	21	-9,5%
Estonia	1,69	[1,50]	[+12,7%]	6	[7]	[-14,3%]
France	1,97	2,03	-3,0%	342	374	-8,6%
Germany	1,27	1,32	-3,8%	251	308	-18,5%
Greece	2,75	3,25	-15,4%	150	163	-8,0%
Hungary	1,02	1,57	-35,0%	35	48	-27,1%
Iceland	N/A	N/A	N/A	N/A	N/A	N/A

[1003] Von Hlatki, S. (2014): Burden Sharing and Collective Penny Pinching within NATO: The Implementation of Smart Defence, pp. 33-38.

[1004] NATO19 + Bulgaria, Estonia, Latvia, Lithuania, Romania, Slovakia, Slovenia, (2004) + Albania, Croatia, (2009) See: NATO (2022): Member countries, July 2022, Hyperlink: https://www.nato.int/cps/su/natohq/topics_52044.htm?selectedLocale=en (Last visit: 26.08.2022).

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Italy	1,50	1,68	-10,7%	359	483	-25,7%
Latvia	1,09	[1,04]	[+4,8%]	5	[10]	[-50,0%]
Lithuania	0,88	[1,36]	[-35,3%]	25	[17]	[+47,1%]
Luxembourg	0,51	0,68	-25,0%	2	2	+/-0%
Netherlands	1,33	1,44	-7,6%	43	56	-23,2%
Norway	1,52	1,70	-10,6%	24	27	-11,1%
Poland	1,83	1,91	-4,2%	121	228	-46,9%
Portugal	1,98	1,91	+3,7%	90	90	+/-0,0%
Romania	1,25	[2,42]	[-48,3%]	154	[179]	[-14,0%]
Slovak Republic	1,26	[1,84]	[-31,5%]	16	[38]	[-57,9%]
Slovenia	1,60	[1,39]	[+15,1%]	12	[12]	[+/-0,0%]
Spain	1,39	1,63	-14,7%	223	215	+3,7%
Turkey	2,27	3,60	-36,9%	613	665	-7,8%
United Kingdom	2,57	2,41	+6,6%	174	211	-17,5%
NATO-Europe	**1,53 (av)**	**1,86 (av)***	**-17,7%**	**2.830 (sum)**	**2.990 (sum)***	**-5,4%**
Canada	1,19	1,14	+4,4%	66	66	+/-0%
U.S.	4,92	3,12	+57,7%	1.569	1.421	+10,4%
NATO total	**1,64 (av)**	**1,89 (av)***	**-13,2%**	**4.465 (sum)**	**4.476 (sum)***	**-0,2%**
Russia	*3,59*	*3,55*	+1,1%	*1.430*	*1.386*	*+3,2%*

** The numbers in [brackets] were not included in the average of def. exp/GDP and sum calculations for the Armed Forces quantities of NATO-Europe/NATO total.*

Table 65: Defence expenditures/GDP and Armed Forces personnel numbers in comparison, 2010<->2001[1005]; with arithmetic average (av) of defence expenditures and sum of armed forces [own presentation]

The downward trend in NATO member states' defence expenditures in comparison to 2001 also continued in 2010. In that period, nine allies employ a 'double-digit' decrease, while four members shows a 'one-digit' increase (Portugal, UK, Canada, U.S.). Particularly noteworthy is the massive increase in the U.S. defence expenditures (+57,7 percent) between 2001 and 2010, which could be explained by the effects of 9/11 on the country's operational activities and persistent forward deployed military presence in the Middle East.

Taking the new member that joined the transatlantic alliance in 2004 and 2008 into the situational picture, five members massively decreased their budgets, while four countries decided to increase them (Albania, Estonia, Latvia, Slovenia).

Considering that the three Eastern European countries Poland, Czech Republic and Hungary were only acceding in 1999, the adjustments in the defence budgets of the Czech Republic (-32,0 percent) and Hungary (-35,0 percent) in comparison to Poland (-4,2 percent) could be

[1005] SIPRI (2022): SIPRI Military Expenditure Database, Hyperlink: https://milex.sipri.org/sipri (Last visit: 23.12.2022); and :Armed Forces data derived from: WorldBank (2022): Armed forces personnel – total, Hyperlink: https://data.worldbank.org/indicator/MS.MIL.TOTL.P1 (Last visit: 08.01.2022).

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drawn upon as an indication that NATO member states with exposed borders employ lesser decreases in comparison to those that are 'encircled by NATO-allied friends'. However, further regional analysis might be required in order to verify that hypothesis given that the third Baltic state Lithuania (-35,3%), which has exposed borders to the South-West (Kaliningrad *oblast*) and to the East (Belarus), had reduced its defence expenditure on the other end of NATO's overall spectrum of defence expenditure decreases.

Overall, the decrease in NATO-Europe's arithmetic average (-17,7 percent) clearly surpassed the one of the NATO total (-13,2 percent) due to increasing defence expenditures of Canada and especially the U.S., even though, NATO's defence expenditures were nevertheless shrinking considerably.

In regard to the quantitative changes in the armed forces per NATO member state, only two countries have displayed a positive trend from 2001 to 2010, namely the U.S. (+10,4 percent) and Slovenia (+3,7%), while Luxembourg, Portugal, and Canada stagnated (+/-0 percent). In addition, and at the same time, eight NATO allies decreased their military personnel by a two-digit percentage. Of those nine Eastern and Southern European countries that were not NATO members in 2001, only Lithuania had a positive development (+47,1 percent), while Slovenia stagnated (+/-0 percent) and the seven remaining countries decreased military personnel by double-digit percentages.

Overall, NATO's total quantity was just slightly decreasing since 2001 (-0,2 percent). Meanwhile, the U.S. increases compensated much from the force reductions from NATO-Europe (-5,4 percent).

A quantitative comparison between the U.S. total armed forces from 2001 to 2010 provided a considerable increase (+10,4 percent), while the particular U.S. contributions to NATO in terms of military personnel forward deployed to Europe show a stark drop (-41,4 percent) (see Table 61). This relationship provides an indication that Europe became less and less a focus of the quantitative military presence (notwithstanding the importance of Europe as a strategic logistics and force projection hub, *inter alia*, through Ramstein Airbase[1006] and Landstuhl medical facility as the largest U.S. hospital outside the continental U.S.[1007])

	2010	***2001***	***Difference***
U.S. Military Personnel Forward Deployment to Europe (in thousand)	66	111	-41,4%

[1006] US Air Force (n.a.): Ramstein Air Base, Hyperlink: https://www.ramstein.af.mil/About/ (Last visit: 07.02.2023).

[1007] The Defense Post (2022): US to Build Largest Overseas Military Hospital in Germany, Hyperlink: https://www.thedefensepost.com/2022/01/25/us-military-hospital-germany/ (Last visit: 07.02.2023).

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Table 66: U.S. military personnel in Europe, comparison 2001 <-> 1992[1008] [own presentation]

Taking Russia into account as a benchmark for NATO, a comparison of Russia's data in Table 57 and Table 59 shows that Russia under President Putin succeeded in turning the tide on both defence expenditures per GDP (+1,1 percent) as well as on the quantity of its armed forces (+3,2 percent). Thus, Russia's military input factors of defence expenditure and military personnel underwent a positive change, while NATO was still not able to stop the negative trends (both in total as well as Europe only).

Continue the reform and modernisation of NATO's structures to keep the alliance generic mission-ready:

From the very beginning in 2002, the NATO Response Force (NRF) has been designed in strong accordance with the non-Article 5 tasks that NATO's member states, and the U.S. in particular, foresaw for the transatlantic alliance in the aftermath of 9/11. Out-of-Area operations, such as the support to U.S. troops in Afghanistan. Throughout the second decade of the post-Cold War era, NATO had worked on the conceptual and practical troubles that the NRF went through in order to make the force one to be reckoned with in non-Article 5 missions and operations. One persistent issue for the NRF still remained, however, which was the modest contribution rates of national forces by the member states (from 2007-2010, the semi-annual rotations were filled by approximately 69 percent only). Thus, NATO continued to patch up the gaps in NRF rotations, given that the commitment of NATO's member states to also commit forces to non-NRF contributions, e.g., in the scope of national, multinational, UN, and EU missions and operations.[1009] Nevertheless, the NRF was *the* military tool for the Supreme Allied Commander Europe (SACEUR) as NATO's key multinational force for executing the tasks as given by the North Atlantic Council (NAC). Given that the NRF consists of national forces, all NATO member states must principally

> "[…]
> - develop and **maintain robust, mobile and deployable conventional forces** to carry out both our Article 5 responsibilities and the Alliance's expeditionary operations, including with the NATO Response Force;" (2010 NATO Strategic Concept)[1010]

[1008] Statista (2022): Number of United States military personnel in Europe from 1950 to 2021, Hyperlink: https://www.statista.com/statistics/1294309/us-troops-europe/ (Last visit: 05.06.2022).
[1009] Ringsmose, J. (2010): Taking Stock of NATO's Response Force, pp. 1-5, Hyperlink: https://www.ndc.nato.int/download/downloads.php?icode=159 (Last visit: 08.02.2023).
[1010] See paragraph 19, third bullet point, in: NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', p. 15, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 03.12.2022).

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Following the 2008 Russo-Georgian War, discussions among NATO member states unfolded whether the NRF should gain a stronger focus on Article 5-related operations as well. The UK proposed a smaller token force that was intended to serve as a tripwire which would have led the contributing allies to commit more troops in case that their soldiers in that force had been attacked. Eventually, the idea did not fly and the NRF was modified instead in order to cater for the Eastern European member states' national security concerns.[1011]

Subsequently, the 2012 NATO Deterrence and Defence Posture Review underlined the complex set of requirements that the NRF was required to provide to NATO.

> "Among their key characteristics, the **Allies' forces must be modern, flexible, and interoperable, capable** of meeting a wide range of circumstances, including if necessary **high-intensity combat operations**. Such forces must be able to successfully **conduct and sustain** a range of **operations for collective defence** and crisis response, **including at strategic distance**. […] Allies are committed to increasing the opportunities for their conventional forces, especially those in the **NATO Response Force**, to **train and exercise** together and in that way, among others, to **strengthen their ability to operate in concert anywhere on Alliance territory** and beyond." (2012 NATO DDPR)[1012]

Considering that these demands were of such diversity, it did not come as a surprise that the NRF was not fully capable of reassuring the Eastern European states (the three Baltic states and Poland in particular) in the aftermath of the 2014 Russian annexation of Ukraine and the ongoing proxy war in the Donbass region. At the 2016 NATO Summit in Warsaw, the heads of state and government agreed to deploy four forward deployed (battalion-sized[1013]) Battlegroups, each one commanded by one lead nation and several contributors that sent troops on a rotational basis[1014] (in compliance with the 1997 NATO-Russia Founding Act, that did not allow permanent stationing of troops in the new post-Cold War era member states; see subchapter 4.2.5).

Regardless of the initial shortfalls, the NRF grew over the first decade in size and importance for NATO's member states and thus, became the core of NATO's deterrence and defence posture after the 2014 Wales summit. There, NATO's heads of state and government contemplated about the implications of Russia's 2014 aggression against Ukraine for the Euro-

[1011] Ringsmose, J. (2010): Taking Stock of NATO's Response Force, pp. 5-8, Hyperlink: https://www.ndc.nato.int/download/downloads.php?icode=159 (Last visit: 08.02.2023).
[1012] See paragraph 14, in: NATO (2012): Deterrence and Defence Posture Review, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_87597.htm (Last visit: 10.01.2023).
[1013] Numerical values for military formations, such as a battalion's size, can be found under No. V the Appendices.
[1014] NATO (2022): NATO's Enhanced Forward Presence - Factsheet, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/2022/2/pdf/2202-factsheet_efp_en.pdf (Last visit: 08.02.2023).

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Atlantic region. As an outcome of that summit, the Readiness Action Plan (RAP) was adopted that led to the introduction of the 20.000 personnel-strong Very High Readiness Joint Task Force (VJTF) with a land brigade[1015] as its core, an increase of NRF up to 40.000 soldiers, further follow-on brigades at higher readiness, further maritime support, air combat and transport components, and some more miscellaneous troop formations.[1016] For 2023, it is expected that the NRF would truly become NATO's central conventional deterrent for any conventional threat against NATO territory. The so-called 'New NATO Force Model' foresees an increase of the NRF from 40.000 to a total of 300.000 soldiers at a three-tiered readiness level.[1017]

Besides the introduction of the NRF as *the* major reformatory element in the NFS, the NCS underwent adaptions on the road to 2010 in parallel. In addition to the external factors, such as the increase in non-Article 5 operations, the decreases in national military capabilities available to NATO also put NATO's command and control structure under stress testing. Instead of managing large military formations against a peer rival's conventional (and potential nuclear) thrust into NATO territory, the NCS had been tasked to become more flexible and deployable itself, so forward deployed troops were to be accompanied by their parts of their operational headquarters. Furthermore, the NCS would have to manage multiple operations at the same time and a total of no more than 13.000 staff positions. Following the 2002 Prague Summit until 2009, when the NAC approved the proposals from NATO's Military Committee (i.e., the highest military body in NATO's decision-making structure), several changes had been made that are herewith shortly presented.[1018]

Since 2002, the NCS was formed with two strategic commands at the top. While the European operational one, known as Allied Command Operations (ACO) located at SHAPE, Belgium had overtaken the traditional strategic command and control for NATO's military operations. The former Allied Command Atlantic (ACLANT) was reformed into the Allied Command Transformation (ACT) that furthermore focussed on doctrinal adaptation, training, exercises,

[1015] Numerical values for military formations, such as a brigade's size, can be found under No. V in the Appendices.
[1016] Arnold, J.-M. (2016): NATO's Readiness Action Plan: Strategic Benefits and Outstanding Challenges, pp. 76-80; and: NATO (2022): NATO Response Force, Hyperlink: https://www.nato.int/cps/en/natohq/topics_49755.htm (Last visit: 05.02.2023).
[1017] NATO (2022): New NATO Force Model - Infographic, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/2022/6/pdf/220629-infographic-new-nato-force-model.pdf (Last visit: 10.01.2023).
[1018] Weinrod, W. B./Barry, C. (2010): NATO Command Structure: Considerations for the Future, pp. 13-16, Hyperlink: https://www.files.ethz.ch/isn/134454/DTP%2075%20NATO%20Command%20Structure.pdf (Last visit: 08.02.2023).

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and interoperability, including cross-national cooperation on military capabilities. NATO ACT remained located at the position of ACLANT, namely in Norfolk, Virginia, U.S.

At the operational level for the missions and operations, ACO employed two Joint Force Command Headquarters, three branch component commands (air, land, sea), and a Communication and Information Services Group. In comparison, ACT got three joint centres that focussed on different areas from a conceptual perspective (Lessons Learned from operations, warfare development, and training development).[1019]

In view of NATO's deterrence and defence posture development throughout the end of the second decade of the post-Cold War era, and in accordance with the military credo "train as you fight", the NCS was continuously adapted with a view to more and more non-Article 5 operations in mind. Taking into account that the NRF is currently under review in reaction to the 2022 Russian invasion of Ukraine, but will most likely increase from the current 40.000 personnel to up to 300.000 soldiers[1020], the urgent question not publicly answered yet is if the current NCS might be up to the task to provide adequate operational support to that scope of formations or if another adaptation of NATO's command structure in parallel to the NFS changes.

Develop and deploy a NATO Ballistic Missile Defence (BMD) capability:

Taking into account that NATO's member states became increasingly concerned by the efforts of third states, first and foremost Iran, to develop intermediate-range ballistic missiles that could reach Europe, NATO decided in 2010 to extend the existing NATO integrated air defence system with a ballistic missile defence capability (NATO BMD).[1021]

> "[…]
> - **develop the capability to defend** our populations and territories **against ballistic missile attack** as a **core element of our collective defence**, which contributes to the indivisible security of the Alliance. We will **actively seek cooperation on missile defence with Russia** and other Euro-Atlantic partners;" (2010 NATO Strategic Concept)[1022]

[1019] NATO (2018): The NATO Command Structure - Factsheet, pp. 1-2, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2018_02/1802-Factsheet-NATO-Command-Structure_en.pdf (Last visit: 07.02.2023).

[1020] NATO (2022): New NATO Force Model - Infographic, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/2022/6/pdf/220629-infographic-new-nato-force-model.pdf (Last visit: 10.01.2023).

[1021] NATO (2022): Ballistic missile defence, Hyperlink: https://www.nato.int/cps/en/natohq/topics_49635.htm (Last visit: 18.07.2022).

[1022] See paragraph 19, sixth bullet point, in: NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', p. 16, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 03.12.2022).

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Given that the U.S. had already invested considerable resources into BMD during the Cold War and continued to do so with increasing speed after the 2002 decision to withdraw from the 1972 ABM Treaty, the U.S. was the prime contributor of such a system to NATO-Europe. In September 2009, the Obama administration formally adopted its BMD plan for Europe, known as the European Phased Adaptive Approach (EPAA) with four phases. Phase 1 around 2011 should provide a limited theatre-ballistic missile defence (TMD) system by sea-based Aegis systems onboard principal surface ships that could protect parts of Southern Europe. Phase 2 was planned for 2015. It should add interceptor and radar capabilities, including a land-based interceptor system in Southern Europe. Phase 3 in 2018 should extend the system northward with another second land-based interceptor system in Northern Europe together with the capability to intercept medium- and intermediate-range ballistic missiles[1023]. Lastly, phase 4 planned to introduce further advanced interceptors that could intercept Intercontinental Ballistic Missiles (ICBMs).[1024]

The actual realization of the project occurred over a period of 9-10 years. Phase 1 was executed in 2011 by the deployment of Aegis defence systems aboard ships located in the Spanish port of Rota. Phase 2 was completed with an initial operational capability for a land-based Aegis-Ashore system in Romania in 2016 at the end of the period of examination of this dissertation.[1025] The implications of a working BMD system, let alone a strategic BMD against land-based ICBM, had been just one of many concerns that Russia harboured against NATO's policies on its deterrence and defence posture.[1026]

> "**NATO missile defence is not oriented against Russia** nor does it have the capability to undermine Russia's strategic deterrent. **The Alliance**, in a spirit of reciprocity, maximum transparency and mutual confidence, will **actively seek cooperation on missile defence with Russia** […]" (2012 NATO DDPR)[1027]

[1023] Land-based medium- and intermediate-range ballistic missiles were a central issue in Europe in the 1980s of the Cold War. The U.S. and the USSR had agreed to remove and destroy all of those missiles, including provisions not to develop any further ones, in line with the 1978 INF Treaty, see subchapter 4.2.4.
[1024] US Department of Defense (2010): Ballistic Missile Defense Review Report, February 2010, pp. 24 f. and pp. 29 f., Hyperlink: https://dod.defense.gov/Portals/1/features/defenseReviews/BMDR/BMDR_as_of_26JAN10_0630_for_web.pdf (Last visit: 04.02.2023).
[1025] MDAA (2018): European Phased Adaptive Approach (EPAA), Hyperlink: https://missiledefenseadvocacy.org/missile-defense-systems-2/missile-defense-systems/policy-coming-soon/european-phased-adaptive-approach-epaa/ (Last visit: 07.02.2023).
[1026] The NATO-Russia post-Cold War era relationship has been marked by a deep divide in the mutual understanding of cooperation, see: NATO Review (2011): NATO and Russia: doomed to disappointment? Hyperlink: https://www.nato.int/docu/review/articles/2011/07/11/nato-and-russia-doomed-to-disappointment/index.html (Last visit: 07.02.2023).
[1027] See paragraph 21, in: NATO (2012): Deterrence and Defence Posture Review, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_87597.htm (Last visit: 10.01.2023).

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To a certain extent, the decision by the Obama administration to scrap phase 4 of the EPAA in March 2013 due to funding cuts by congress might have eased the concerns a bit, especially since the representatives of the U.S. government were interested in further nuclear disarmament efforts by Russia after the successful adoption of the 2010 New START treaty. Meanwhile, Russia remained interested in a legally binding commitment by the U.S. to abstain from strategic BMD deployment in Europe.[1028]

Aligning BMD technology with diplomacy, Diesen and Keane argued that the cancellation of phase 4 of the EPAA indicated that NATO had been willing to alleviate Russia's concerns towards NATO's BMD in view of the failed attempts for further NATO-Russia cooperation on that matter. The cancellation meant that the system would not be upgraded with interceptor variants capable of destroying long-range ballistic missiles. Despite the mutually agreed step of NATO, the alliance did neither promise to not introduce such missiles in Europe at an indetermined later point in time nor was it publicly communicated that the cancelation of phase 4 was a response to Russia's national security interests.[1029]

While the value of BMD led to the first deployment of an initial limited TMD for NATO by 2011, the 2012 NATO Deterrence and Defence Posture Review underlined the necessity to continue on the mutually agreed course that nuclear weapons remain the indispensable cornerstone for deterring third states from using, *inter alia*, WMD like nuclear weapons against a NATO member state's territory and population.

> "Missile defence can **complement the role of nuclear weapons in deterrence**; it **cannot substitute for them**. This capability is **purely defensive** and is being established in the light of **threats from outside the Euro-Atlantic area**. It is expected that NATO's missile defence capabilities would **complicate an adversary's planning**, and **provide damage mitigation**. Effective missile defence could also provide **valuable decision space** in times of crisis." (2012 NATO DDPR)[1030]

In accordance with Thränert, there might be different interest groups among NATO's member states that either wish to increase the alliance's orientation towards missile defence, retain the nuclear deterrent's key role, or even aspire a stronger cooperative disarmament, arms control, and non-proliferation approach in NATO's policies. The consensus in line with the 2012 NATO DDPR had been to continue the implementation of NATO's plans for the EPAA. Thus, the

[1028] ACA (2013): Pentagon Shifts Gears on Missile Defense, Hyperlink: https://www.armscontrol.org/act/2013-04/pentagon-shifts-gears-missile-defense (Last visit: 07.02.2023).
[1029] Diesen, G./Keane, C. (2018): The offensive posture of NATO's missile defence system, pp. 84 f.
[1030] See paragraph 20, in: NATO (2012): Deterrence and Defence Posture Review, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_87597.htm (Last visit: 10.01.2023).

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NATO BMD definitely proceeds further beyond the timeframe of this dissertation examination.[1031]

U.S. strategic nuclear forces remain supreme security guarantee:

Lastly, the question of the strategic nuclear deterrent for the non-nuclear member states of the transatlantic alliance has been solved in the 2010 NATO Strategic Concept in line with the previous two iterations, wherein a 'standardised text bloc' has been reiterated.

> "The **supreme guarantee of the security of the Allies** is provided by the **strategic nuclear forces** of the Alliance, **particularly those of the United States**; the **independent strategic nuclear forces** of the **United Kingdom and France**, which have a **deterrent role of their own**, **contribute to the overall deterrence** and security of the Allies." (2010 NATO Strategic Concept)[1032]

Furthermore, the 2012 NATO Deterrence and Defence Posture Review, which had provided some more details of the other aspects of NATO's deterrence and defence posture, underlined the known politico-military context of the pre-2014 time, wherein Russia did not yet absorb neighbouring territory into its own state by force.

> "The **circumstances** in which any **use of nuclear weapons** might have to be contemplated are **extremely remote**. As long as nuclear weapons exist, NATO will remain a nuclear alliance." (2012 NATO DDPR)[1033]

On the other side, and in conjunction with NATO's activities regarding BMD, the 2012 DDPR report highlighted the politico-military strategic thinking of NATO regarding the different aspects of deterrence.

> "**Nuclear weapons are a core component** of NATO's overall capabilities for deterrence and defence **alongside conventional and missile defence forces**. The review has shown that the Alliance's **nuclear force posture currently meets the criteria** for an **effective deterrence and defence posture**." (2012 NATO DDPR)[1034]

Thus, elevating missile defence at an equal level to conventional and nuclear forces as a component of NATO's deterrence and defence posture has been certainly a novelty, which

[1031] Thränert, O. (2011): NATO's Deterrence and Defense Posture Review, pp. 1 f., Hyperlink: https://www.swp-berlin.org/publications/products/comments/2011C34_trt_ks.pdf (Last visit: 07.02.2023).
[1032] See paragraph 18, in: NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', p. 14, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 03.12.2022).
[1033] See paragraph 9, in: NATO (2012): Deterrence and Defence Posture Review, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_87597.htm (Last visit: 10.01.2023).
[1034] See paragraph 8, in: NATO (2012): Deterrence and Defence Posture Review, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_87597.htm (Last visit: 10.01.2023).

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might have been a compromise between the proponents of BMD in NATO vis-à-vis those with a nuclear or disarmament focus.[1035]

Following the 2014 Russian annexation of Crimea and subsequent proxy war in the Donbass region, NATO quickly responded at the 2014 Wales summit with a Readiness Action Plan (RAP) to increase the robustness of its forces in view of any potential threat against NATO member states' territory. Beside a number of conventional measures, the RAP has proven an absence of any increased efforts in readiness of NATO's nuclear deterrent.[1036]

Taking into account that introducing new elements on nuclear deterrence might be a task for the highest national authorities of the NATO member states, there was no substantial new language on its nuclear deterrence posture in the 2014 Wales summit declaration[1037] and in the 2016 Warsaw summit communique[1038] either. As a consequence, and due to the usual classification for questions concerning nuclear matters, it can only be assumed that NATO continued with the nuclear *status quo* of mainly leaving the operation details of nuclear weapons to the U.S. while retaining nuclear sharing arrangements for the non-strategic nuclear weapons that the U.S. forward deployed to selected allied European countries.

Following the application of the four operational indicators in Table 59 of subchapter 4.4.2.1 on the 2010 NATO Strategic Concept and supplemented by the 2012 NATO Deterrence and Defence Posture Review, the NATO 'collective' employed an inconclusive deterrence and defence posture in the initial-Cold War era (excluding the U.S. extended nuclear deterrence for NATO which is separately addressed in subchapter 4.5).

The individual results from the evaluation of the four indicators leading to that inconclusive result were the following:

(1) *Limit/remove a forward presence in allied member states' territory with exposed borders (soft)*:

By 2010, NATO's member states still abided by the 1997 NATO-Russia Founding Act (see subchapter 4.2.5), wherein NATO's member states expressed security guarantees to Russia, thereby confirming that the alliance will not deploy any nuclear weapons on the NATO territory of the member states that acceded the alliance after 1997.

[1035] Thränert, O. (2011): NATO's Deterrence and Defense Posture Review, pp. 1 f., Hyperlink: https://www.swp-berlin.org/publications/products/comments/2011C34_trt_ks.pdf (Last visit: 07.02.2023).
[1036] NATO (2022): Readiness Action Plan, Hyperlink: https://www.nato.int/cps/en/natohq/topics_119353.htm (Last visit: 08.02.2023).
[1037] See paragraphs 22, 49 f, and 52 f., in: NATO (2014): Wales Summit Declaration, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_112964.htm (Last visit: 27.01.2023).
[1038] See paragraphs 52-55, 59, and 65, in: NATO (2016): Warsaw Summit Communiqué, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_133169.htm (Last visit: 27.01.2023).

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(2) *No or limited definition of generalised military capability requirements pertaining to the tasks of the military alliance (soft)*:

NATO also began to revise its defence planning in the second decade of the post-Cold War era in order to properly plan the different requirements for NATO in terms of its deterrence and defence as well as crisis management operations tasks. However, while the 2010 NATO Strategic Concept moved the core task of collective defence to the top (in comparison to the 1991 and 1999 NATO Strategic Concepts), it still lacked a joint vision among NATO's member states for NATO's deterrence and defence posture vis-à-vis a common peer- or near-peer competitor of the transatlantic alliance[1039]

(3) *Establish a balance between national commitments and multinational formations in the military alliance's deterrence and defence posture (hard)*:

Following two decades of continuous decreases in defence expenditures as well as military manpower in NATO's member states, the transatlantic alliance arrived at a point were internal frictions in the cohesion of the alliance from both a credibility as well as capability point of view appeared. The 2012 NATO DDPR has underlined that NATO's major requirements have to be fulfilled on the basis of the individual NATO member states' national militaries and the member states cannot rely on a multinational force, such as the NRF which lacked military commitments since its inception in 2002[1040]. Hence, an adequate level of national defence expenditures is required (NATO discussed the two percent defence expenditures per GDP already since 2006[1041]).

(4) *Increase/retain the nuclear dimension of the military alliance's deterrence and defence posture (hard)*:

By 2010, NATO's member states still abided by the 1997 NATO-Russia Founding Act (see subchapter 4.2.5), wherein NATO's member states expressed security guarantees to Russia, thereby confirming that the alliance will not deploy any nuclear weapons on the NATO territory of the member states that acceded the alliance after 1997.

Furthermore, NATO continued upon its course to repeat its nuclear clause from the 1991 and 1999 NATO Strategic Concepts in the 2010 NATO Strategic Concept. In essence, the U.S. continued to be the prime nuclear security provider for the transatlantic alliance for as long as nuclear weapons exist. Furthermore, the independent strategic nuclear deterrent of

[1039] NATO (2022): NATO Defence Planning Process, Hyperlink: https://www.nato.int/cps/en/natohq/topics_49202.htm (Last visit: 22.07.2022).
[1040] Ringsmose, J. (2010): Taking Stock of NATO's Response Force, pp. 1-5, Hyperlink: https://www.ndc.nato.int/download/downloads.php?icode=159 (Last visit: 08.02.2023).
[1041] NATO (2023): Funding NATO, Hyperlink: https://www.nato.int/cps/en/natohq/topics_67655.htm (Last visit: 14.02.2023).

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France and the UK practically contribute to NATO's military security through their existence.

Beyond the classical nuclear domain, NATO's considerations regarding the development of a ballistic missile defence system began to surface throughout the second decade of the post-Cold War era. Subsequently, intensive discussions ensued between NATO and Russia about Russia's concerns that NATO's BMD system would be aimed against Russia and in extension against the established strategic (nuclear) balance in Europe. NATO attempted to pursue a cooperation in the scope of NATO's BMD with Russia but without success. While NATO continued upon its course, the new U.S. administration under Obama adapted the previous BMD plans and delayed any critical capability of the system to intercept ICBMs into the future (see subchapter 4.5.2.4).

4.4.3 NATO's post-Cold War conventional and nuclear capabilities

This subchapter consists of four further subchapters. Subchapter 4.4.2.1 provides a general introduction to the analysis of the credibility of NATO' deterrence and defence posture in line with the qualitative methodology as presented in subchapter 4.1.2.1. The subchapters 4.4.2.2 to 4.4.2.4 are dedicated to three iterations of NATO's key politico-military document in order to analyse the credibility of NATO's posture in line subchapter 4.1.2.1. The overall results are collected and presented in conjunction with the results from subchapter 4.4.3 in the interim conclusion on Russia's threat posture throughout the examined periods in subchapter 4.4.4.

4.4.3.1 Introduction

Following the end of the Cold War, which was initiated by the disintegration of the Warsaw Pact and the end of the Soviet Union, NATO was searching for a new politico-military identity given that its former key adversaries had disappeared after 1991.

From external perspective, NATO was still useful for some member states that were concerned that Russia might deviate from its transition to democracy, considering that an authoritarian Russian regime armed with considerable conventional and nuclear weapons could threaten European allies in NATO at some point in the future. Especially Norway was concerned about such a prospect, because it was the only country that had an exposed border to the Soviet prime successor state Russia at the time. Furthermore, there were several intra-alliance dynamics that had to be kept in mind. One such element was a strong reunited Germany that would pose a

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shift in the politico-military balance between the different countries in Europe (particularly from the point of view from France).

Other questions were less strategic and more practical, since many member states had focussed their national security and defence policies on NATO to such an extent throughout the Cold War that critical military functions usually required in the command and control of national armed forces were delegated to the NATO integrated military structures (e.g., strategic headquarters). Furthermore, considering that military capabilities were became increasingly advanced in the late Cold War, not all NATO member were able or willing to afford those capabilities on their own. In this sense, NATO enabled different options such as the joint funding and fielding of key capabilities (e.g., airborne early warning and control aircraft) or the increasing reliance on one or mor allies that provided that capability for the others.[1042]

From a capability perspective, the 1991 NATO Strategic Concept pointed out the balance between delegation of the provision of military capabilities to the NATO-level and the responsibility to commit military capabilities from the holdings of NATO's member states.

> "The **Alliance's ability** to accomplish the full range of its missions will **rely increasingly on multinational forces**, **complementing national commitments to NATO** for the Allies concerned." (1999 NATO Strategic Concept)[1043]

However, the statement from the 1991 iteration of the strategic concept did neither explain how much one member state should commit[1044] to the alliance nor how much a member state may rely on the provision of the commitments from other member states.

While NATO as an international organization was successful in maintaining its survival after the end of the Cold War by moving its purpose to cooperative security and crisis management[1045], the NATO member states, with a few exceptions as noted by Hartley[1046], have started reducing their national defence budgets as well as their military capabilities.

> "In the beginning of the nineties, while avoiding speaking of a threat and using terms like risks or challenges instead, we [i.e. NATO] did not radically drop the old yardstick. The **forces and capabilities** of the Soviet Union and then **Russia remained an important orientation mark**. Over time, however, the **importance of this factor**

[1042] Duffield, J. (1995): NATO's Functions after the Cold War, pp. 768 f. and pp. 773-776.
[1043] See paragraph 61, in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022).
[1044] NATO's member states agreed to delegate the task of identifying and distributing requirements for a credible and capable NATO deterrence and defence posture to NATO international (military) staff. This process is known as NATO Defence Planning Process (NDPP) and is not further deepened in this dissertation. For more information, see: NATO (2022): NATO Defence Planning Process, Hyperlink: https://www.nato.int/cps/en/natohq/topics_49202.htm (Last visit: 22.07.2022).
[1045] Duffield, J. (1995): NATO's Functions after the Cold War, pp. 763-767 and pp. 769-772.
[1046] The exceptions are Greece, Luxembourg, Portugal, and Turkey. See: Hartley, K. (1998): State budget in a changing economic and security environment, pp. 129-130, Hyperlink: https://www.nato.int/docu/colloq/1998/13-hartley.pdf (Last visit: 30.07.2022).

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> **declined**, and others, such as the **demands of actual operations in the former Yugoslavia** and **conceivable operations** in other crisis areas assumed **greater weight**." (Pfeiffer)[1047]

In line with Pfeiffer, whose argumentation undergirds the hypothesis that the disappearance of a unifying adversary leads to a decrease in defence budgets and military capabilities. On a positive note, NATO could potentially attempt to pursue a reverse of this negative situation by accepting new member states to the alliance. In the timeframe under examination, a total of three NATO enlargement were conducted. Table 63 shows the duration of each NATO country formation with the specific naming of the countries covered in the respective footnotes.

Number of NATO allies	*Years*[1048]	*Duration of the specific membership set*
NATO16[1049]	1992-1998	7 years
NATO19[1050]	1999-2003	5 years
NATO26[1051]	2004-2008	5 years
NATO28[1052]	2009-2016[1053]	8 years

Table 67: NATO member nations grouped by the enlargement years 1999, 2004, 2009

At this point, it should be underlined that the capability-related analyses in subchapters 4.4.3.2 to 4.4.3.5 does not aim at exploring the individual contributions from NATO's (old and new) member states. The value of these subchapters is the insight, if the aggregate of NATO's military capabilities in each examined year is 'credible' or at least 'partially credible' from the perspective of PDT.

In the same vein regarding the completeness of data for NATO, henceforth, whenever the years 1992, 1995 and 1998 are mentioned, the quantities from the NATO "at 16 members" were

[1047] Pfeiffer, H. (2008): Defence and Force Planning in Historical Perspective: NATO as a Case Study, p. 118, Hyperlink: https://www.baltdefcol.org/files/files/documents/Research/5_%20Holger%20Pfeiffer-Defence%20and%20Force%20Planning%20in%20Historical%20Perspective-NATO%20as%20a%20Case%20Study.pdf (Last visit: 29.12.2022).

[1048] The initial NATO member group and NATO enlargements prior to 1992 are omitted.

[1049] The NATO16 member nations were: Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Turkey, United Kingdom, United States, (1992 and earlier). See: NATO (2022): Member countries, July 2022, Hyperlink: https://www.nato.int/cps/su/natohq/topics_52044.htm?selectedLocale=en (Last visit: 26.08.2022).

[1050] NATO16 + Czech Republic, Hungary, Poland. (1999 and earlier). See: NATO (2022): Member countries, July 2022, Hyperlink: https://www.nato.int/cps/su/natohq/topics_52044.htm?selectedLocale=en (Last visit: 26.08.2022).

[1051] NATO19 + Bulgaria, Estonia, Latvia, Lithuania, Romania, Slovakia, Slovenia, (2004 and earlier). See: NATO (2022): Member countries, Hyperlink: https://www.nato.int/cps/su/natohq/topics_52044.htm?selectedLocale=en (Last visit: 26.08.2022).

[1052] NATO26 + Albania, Croatia, (2009 and earlier) See: NATO (2022): Member countries, July 2022, Hyperlink: https://www.nato.int/cps/su/natohq/topics_52044.htm?selectedLocale=en (Last visit: 26.08.2022).

[1053] From 2017 onward, further countries joined or were in the process of joining NATO. These enlargements are beyond the timeframe of this paper. See: NATO (2022): Member countries, July 2022, Hyperlink: https://www.nato.int/cps/su/natohq/topics_52044.htm?selectedLocale=en (Last visit: 26.08.2022).

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aggregated. When the year 2001 is addressed, the quantities for NATO is calculated "at 19 members". For 2004 and 2007, quantities for NATO is reached "at 26 members". Lastly, for 2010, 2013 and 2014, NATO's sum of quantities reached the "at 29 members" level.

When NATO-Europe is mentioned, the same logic is applied, albeit North America (Canada and the U.S.) has been excluded in the calculation in every year.

The first general dataset under scrutiny in order to identify NATO's general level military capabilities is represented by the arithmetic averages of NATO total's and NATO-Europe's defence expenditures per GDP in percentage. The data is taken from the SIPRI Military Expenditures (MILEX) database. For a comparative perspective, Table 64 also includes the individual defence expenditures of the defender (U.S.) as well as challenger (Russia) of the integrated conventional/nuclear deterrence game.

Defence Expenditures per GDP	***1992***	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
NATO total – arithmetic average	**2,58**	2,19	2,00	**1,89**	1,79	1,67	**1,64**	1,47	1,44
NATO-Europe only – arithmetic average	**2,45**	2,12	1,97	**1,86**	1,73	1,58	**1,53**	1,39	1,37
U.S.	**4,97**	3,86	3,20	**3,12**	4,02	4,08	**4,92**	4,05	3,70
Russia	**4,43**	3,78	2,73	**3,55**	3,30	3,12	**3,59**	3,85	4,11

Table 68: Overview on the defence expenditures per GDP in percentage 1992-2014, triennially compiled data plus 2014[1054] *[own description]*

In the initial Cold War era, the arithmetic averages of NATO total (includes Canada and the U.S.) and NATO-Europe were both clearly above the two-percent threshold that would bug particularly NATO-Europe's member states in the years after the 2014 NATO Summit in Wales fixated that goal for NATO in a formal summit document.[1055] In comparison to the transatlantic alliance, both Russia as challenger and the U.S. as defender spent almost or around double than NATO in 1992, thus underlining their standing as a current and a former superpower.

After the first decade of the post-Cold War era, all defence expenditures of NATO and both individual players decreased considerably (both NATO averages fell below the two percent threshold). Surprisingly, the decrease in the U.S. had been considerably higher than the one in Russia, which had a higher expenditure in percentage than the U.S. in 2001.

After the second decade of the post-Cold War era, NATO-Europe's negative trend for its defence expenditures continued without delay. Meanwhile, Russia's defence expenditures

[1054] Data for the member states of NATO was selected and exported from SIPRI's Milex database, then aggregated to the above numbers. For reference, see: SIPRI (2022): SIPRI Military Expenditure Database, Hyperlink: https://milex.sipri.org/sipri (Last visit: 23.12.2022).

[1055] Kamp, K.-H. (2019): Myths Surrounding the Two Percent Debate – on NATO defence spending, pp. 1-5, Hyperlink: https://www.baks.bund.de/sites/baks010/files/working_paper_2019_9.pdf (Last visit: 01.08.2022).

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stagnated at a relatively high level with a minimum increase. In comparison to both NATO and Russia, the U.S. has continued its increase in defence expenditures that was already visible by 2004 (probably due to the U.S. military response to the 9/11 terrorist attacks from 2001).

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
NATO total (Average *in brackets*)	**5.154** **(344)**	4.865 (304)	4.747 (297)	**4.476** **(236)**	4.632 (185)	4.540 (175)	**4.465** **(159)**	4.223 (151)	4.147 (148)
NATO-Europe only (Average *in brackets*)	**3.152** **(242)**	3.153 (225)	3.083 (220)	**2.990** **(176)**	3.088 (134)	2.921 (122)	**2.830** **(109)**	2.724 (105)	2.695 (104)
U.S.	**1.920**	1.636	1.594	**1.421**	1.473	1.555	**1.569**	1.433	1.381
Russia	**1.900**	1.800	1.702	**1.386**	1.452	1.476	**1.430**	1.260	1.287

Table 69: Number of Military Personnel (in thousand) 1992-2014, triennially compiled data plus 2014[1056] [own description]

A brief look at the total numbers shows a continuous but shrinking dominance of NATO's armed forces in comparison to Russia throughout the examined timeframe. In regard to the two individual players, both started with an approximate parity in 1992 and remained to a certain existent on par in 2001 and 2010 as well, albeit with a slight advantage of the U.S.
In addition to the sum of the armed forces of NATO (under both, total and Europe-only conditions), the average number of military personnel throughout NATO's member states in 2010 was more than half of the comparative number from 1992.

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
NATO:Russia	**2,71:1**	2,7:1	2,79:1	**3,23:1**	3,19:1	3,08:1	**3,12:1**	3,35:1	3,22:1
NATO-Europe:Russia	**1,66:1**	1,75:1	1,81:1	**2,16:1**	2,13:1	1,98:1	**1,98:1**	2,16:1	2,09:1

Table 70: Military Personnel Ratio between NATO and Russia, as well as NATO-Europe and Russia in comparison [own calculation]

Despite the continues decrease in NATO's average defence expenditures and the halving of the average number of armed forces among NATO's member states throughout the three instances under examination (1992, 2001, 2010), NATO retained an advantage in military personnel. Considering the negative trend in NATO's average defence expenditures in comparison to Russia, a more detailed look at the actual military capabilities should provide a clearer situational picture regarding the 'capability' of NATO's deterrence and defence posture.
Following in the tracks of the capability-related analysis conducted for Russia in the subchapter 4.3.3 the alternative datasets from 2022 Statista and 2022 NATO Projected Global Firepower

[1056] Data derived from the World Bank in 2022. Furthermore, the following World Bank definition applies: "Armed forces personnel are active duty military personnel, including paramilitary forces if the training, organization, equipment, and control suggest they may be used to support or replace regular military forces." WorldBank (2022): Armed forces personnel – total, Hyperlink: https://data.worldbank.org/indicator/MS.MIL.TOTL.P1 (Last visit: 08.01.2022).

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are hereby added as well. While the following raw data derived from the alternative datasets is identical with those in subchapter 4.3.3 with its further subchapters 4.3.3.2 to 4.3.3.5, the calculation made NATO:Russia displays the NATO perspective on the capability ratio towards Russia.

	2022 Statista based on Global Firepower and SIPRI			*2022 NATO Projected Global Firepower*		
	NATO	*Russia*	*NATO:Russia*	*NATO*	*Russia*	*NATO:Russia*
Total military personnel	5.405.700	1.350.000	4:1	N/A	N/A	N/A
Active soldiers	3.366.000	850.000	3,96:1	N/A	N/A	N/A
Reserve forces	1.301.000	250.000	5,2:1	N/A	N/A	N/A
Paramilitary units	738.700	250.000	2,95:1	N/A	N/A	N/A
Combined Manpower	N/A	N/A	N/A	466.590	825.000	0,57:1
Frontline Manpower	N/A	N/A	N/A	336.690	637.500	0,53:1
Reserve Manpower	N/A	N/A	N/A	129.900	187.500	0,69:1

Table 71: Alternate datasets for a NATO:Russia comparison per air domain capability, reference year: 2022[1057] [own calculation]

The 2022 Statista dataset basically confirms the situational picture regarding NATO's armed force personnel from Tables 65 and 66, i.e., NATO has an overwhelming manpower vis-à-vis Russia. However, it all comes back to the commitment of the individual member states. If NATO does not double its efforts (20 percent commitment instead of the ten percent commitment as per the Global Firepower's assumption), NATO cannot ensure a 'capable' potential of military personnel for the general deterrence of a Russian attempt at issuing a threat towards one of NATO's allies. However, it should be noted that the military personnel quantity is an important but not the only cornerstone for a 'capable' deterrence and defence posture for the transatlantic alliance.

4.4.3.2 Air domain capabilities

The air domain represents an important field of intra-alliance deterrence and defence cooperation as well as a critical operational environment. As introduction to this subchapter,

[1057] Compare: Statista (2022): Comparison of the military capabilities of NATO and Russia as of 2022, Hyperlink: https://www.statista.com/statistics/1293174/nato-russia-military-comparison/ (Last visit: 25.01.2023); with: GFP (2022): 2022 NATO Projected Global Firepower, Hyperlink: https://www.globalfirepower.com/nato-projected-firepower.php (Last visit: 25.01.2023).

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three examples from NATO's array of air domain capabilities are briefly introduced. Then, the actual analysis of the aggregate of air domain capabilities in NATO as well as NATO-Europe take place together with the ratio comparison with Russia.

The first example is NATO's integrated air defence system. The roots of NATO's joint cooperation efforts in air defence date back to the 1960s of the Cold War. In these days, the transatlantic alliance expected a unidirectional attack from its key adversary, the Soviet Union with its Warsaw Pact allies.

Throughout the Cold War, NATO's member states continuously developed a capable and credible air defence system as part of NATO's deterrence and defence posture based on multiple nationally operated radars, surface-to-air missiles and quick reaction alert interceptor aircraft, later supplemented by NATO-owned early warning capability like the AWACS surveillance planes. In the post-Cold War era, the challenge of offensive ballistic and cruise missile threats from rogue threat became a central focus for NATO's member states.[1058]

In the post-Cold War era, cooperation between NATO's member states continued but became omnidirectional in order to ensure an adequate and timely situational picture about activities in the sky above NATO's territory and the required air defence systems to intercept and eliminate any adversary's incoming aircraft and ballistic missile attack since the inception of NATO's BMD development and deployment from 2010 onward.[1059] Eventually, the transatlantic alliance's air defence system evolved into the NATO Integrated Air and Missile Defence System (NATINAMDS) under the authority of the Supreme Allied Commander Europe (SACEUR).[1060]

The second example is NATO's airborne intelligence, surveillance, and reconnaissance as well as early warning and control systems. In the late Cold War, the pictures of the large aircraft with the rotating radar disk on its back, commonly known as AWACS, were commonly connected with NATO that provided important information to the allies in NATO's post-Cold War era crisis management operations as well as the support to the U.S. on the basis of Article 5 of the North Atlantic Treaty in the wake of the 9/11 terrorist attacks. After the second decade of the post-Cold War era, NATO extended its surveillance capabilities by deploying common-

[1058] Deutscher Bundestag/Wissenschaftliche Dienste (2014): NATO Integrated Air Defence System (NATINADS), pp. 4-11, Hyperlink: https://www.bundestag.de/resource/blob/867678/a935adb1ee6a5aa3c6ea9c6dd94f0bcb/WD-2-110-13-pdf-data.pdf (Last visit: 09.12.2022).

[1059] NATO (2022): Ballistic missile defence, Hyperlink: https://www.nato.int/cps/en/natohq/topics_49635.htm (Last visit: 18.07.2022).

[1060] NATO (2022): NATO Integrated Air and Missile Defence, Hyperlink: https://www.nato.int/cps/en/natohq/topics_8206.htm (Last visit: 12.02.2023).

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funded unmanned aerial vehicles (UAVs) under the Alliance Ground Surveillance programme in order to have a low-maintenance persistent situational picture on the ground.[1061]

The third example encompasses the efforts by NATO's member states in the field of air policing. Different from air defence, the air policing requires actual deployment of aircraft (e.g., in the Baltic region) that patrol the airspace of the country as well as above international airspace above the sea. In view of potential provocative flight patterns from the Russian Aerospace Forces, the aircraft of NATO's allies are tasked to intercept, identify and escort those potential intruders away from NATO airspace.[1062]

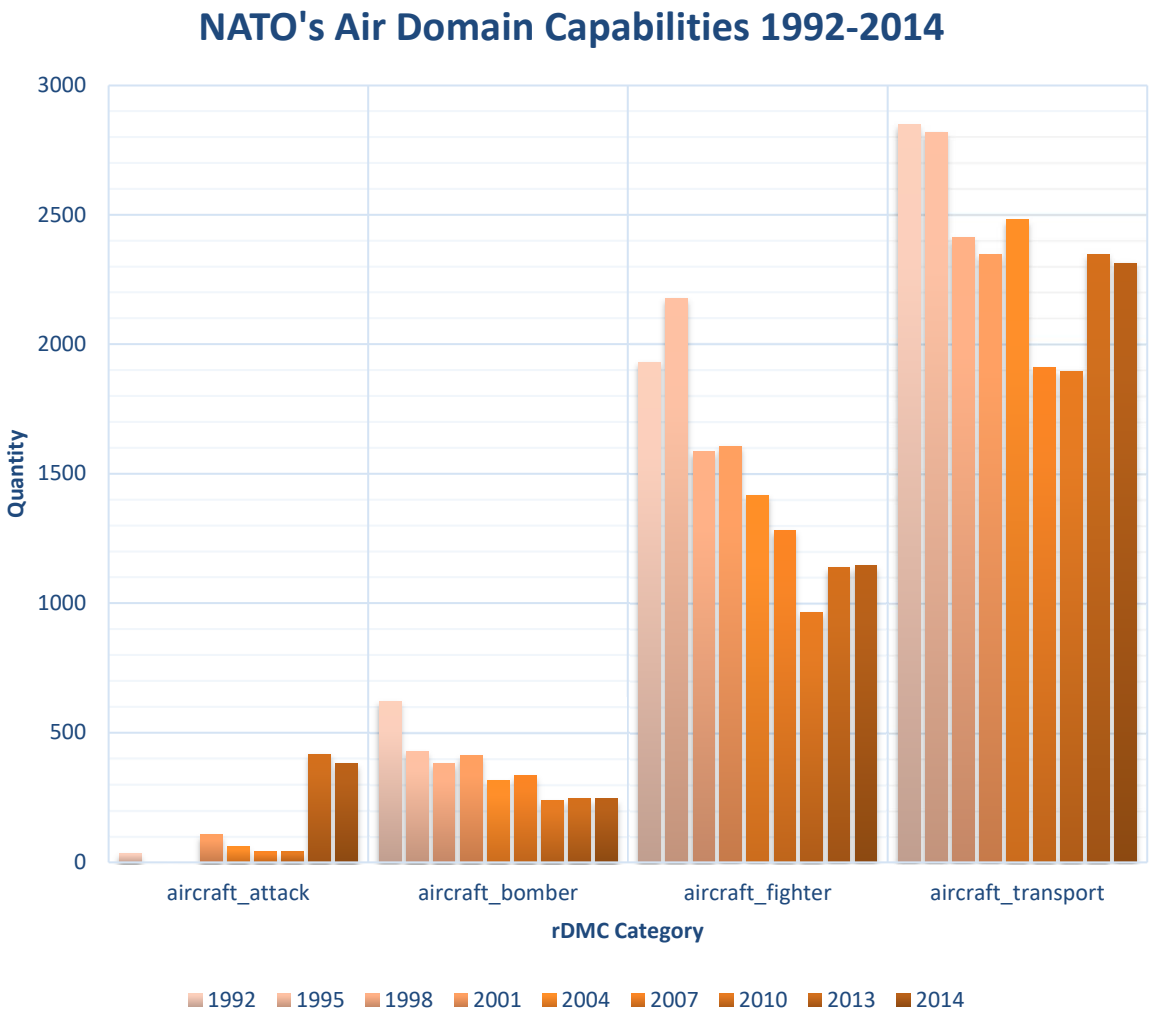

Figure 17: NATO's air domain capabilities 1992-2014, triennially compiled data plus 2014[1063] *[own illustration]*

[1061] NATO (2022): NATO's capabilities, Hyperlink: https://www.nato.int/cps/en/natohq/topics_49137.htm (Last visit: 12.02.2023).
[1062] NATO (2023): NATO Air Policing: securing Allied airspace, Hyperlink: https://www.nato.int/cps/en/natohq/topics_132685.htm (Last visit: 12.02.2023).
[1063] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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Based on the experience from subchapter 4.3.3.1 in regard to Russia's air domain capabilities, one could expect similar fluctuations in the quantities of NATO's capabilities as well, perhaps even more so due to the sensitivity of aggregated data in case when information is incomplete. Surprisingly, the patterns in Figure 17 display a much more 'natural' course, even though the data was partially incomplete for some countries, which was noted in subchapter 4.1.2.2, *inter alia*, for the U.S. with their missing ground-attack aircraft from the U.S. naval aviation. Furthermore, it should also be noted that NATO has quantities for aircraft_attack in some years, but Russia did not. As a result, the ratio was set at 'not available'.

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
aircraft_attack	**NA**	NA	NA	**NA**	NA	NA	**NA**	1,9:1	1,73:1
aircraft_bomber	**0,87:1**	0,91:1	0,34:1	**0,57:1**	0,43:1	1,28:1	**0,23:1**	0,94:1	1,12:1
aircraft_fighter	**0,51:1**	1,45:1	0,63:1	**1,69:1**	1,56:1	1,6:1	**1,16:1**	1,75:1	1,91:1
aircraft_transport	**4,31:1**	13,75:1	11,71:1	**19,07:1**	15,4:1	3,42:1	**4,1:1**	4,34:1	4,26:1

Table 72: NATO:Russia Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[1064] [own calculation]

In the initial post-Cold War era, NATO's ratio still reflects its disadvantages in the offensive air domain capabilities. Therefore, NATO was only 'capable' in one out of four categories (aircraft_transport).

After the first decade of the post-Cold War, that situational picture had partially reversed, when NATO gained quick ground in the aircraft_fighter category, thereby establishing two of four categories as 'capable'. On a short note regarding Russia's aircraft_transport numbers, a data issue might have appeared for the triennials of 1995, 1998, 2001, and 2004, because the pattern in the quantities does not reflect a proper course in comparison to 1992 and 2007 onward.

After the second decade of the post-Cold War, NATO sustained its status as being 'capable' in two of four categories, while losing some ground to Russia in the aircraft_fighter category.

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
aircraft_attack	**NA**	NA	NA	**NA**	NA	NA	**NA**	0,27:1	0,3:1
aircraft_bomber	**0,11:1**	0,07:1	RUS dom.	**RUS dom.**	RUS dom.	(0,19:1)	**RUS dom.**	RUS dom.	RUS dom.
aircraft_fighter	**0,39:1**	1,19:1	0,52:1	**1,45:1**	1,4:1	1,59:1	**1,14:1**	1,02:1	1,16:1
aircraft_transport	**1,62:1**	5,47:1	4,11:1	**6,91:1**	5,8:1	1,91:1	**2,11:1**	1,48:1	1,51:1

RUS dom. = Russia is dominant in that capability/no comparable NATO capability

[1064] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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Table 73: NATO-Europe:Russia Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[1065] [own calculation]

A look at NATO-Europe's air domain capabilities is quite helpful for determining the effects of a potential capability gap between the U.S. and its European allies due to the imbalance in defence expenditure spending overtime.

The situation for NATO-Europe in the initial post-Cold War era does not deviate from the one of NATO total, as the European part of the alliance still retained a 'capable' edge in aircraft_transport. Identical patterns for the time after the first decade (2001) and the second decade (2010) of the post-Cold War era can be identified subsequently. NATO-Europe became 'capable' in aircraft_fighter in 2001 and stayed 'capable' in both aircraft_fighter and aircraft_transport in 2001 as well as 2010. The noteworthy difference between NATO-Europe and NATO total rests within the missing aircraft_bomber. Given that the U.S. and Russia put a high value on their heavy bombers, which contribute their capabilities to the air-based leg of each power's nuclear triad, NATO-Europe apparently did not require such capabilities.

Taking the difference in the data quality of NATO, which can be considered quite good, and the limited data of Russia in those same categories, the alternative datasets of the 2022 Statista and 2022 NATO Projected Global Firepower are used as points of reference in this and the following subchapters on NATO's capabilities in comparison to Russia as well.

	2022 Statista based on Global Firepower and SIPRI			*2022 NATO Projected Global Firepower*		
	NATO	*Russia*	*NATO:Russia*	*NATO*	*Russia*	*NATO:Russia*
Total aircraft	20.723	4.173	4,97:1	2.074	3.130	0,66:1
Fighters/Interceptors	3.527	772	4,57:1	353	579	0,61:1
Ground Attack aircraft	1.048	739	1,42:1	105	554	0,19:1
Transport aircraft	1.543	445	3,47:1	154	334	0,46:1

Table 74: Alternate datasets for a NATO:Russia comparison per air domain capability, reference year: 2022[1066] [own calculation]

Recalling the matching between the rDMC dataset and alternative datasets' categorisation, the total aircraft serves as a general point of reference, Fighters/Interceptors is an approximation to aircraft_fighter, ground attack aircraft as a combination of aircraft_ground attack and aircraft_bombers, and lastly, transport aircraft cate for aircraft_transport.

[1065] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

[1066] Compare: Statista (2022): Comparison of the military capabilities of NATO and Russia as of 2022, Hyperlink: https://www.statista.com/statistics/1293174/nato-russia-military-comparison/ (Last visit: 25.01.2023); with: GFP (2022): 2022 NATO Projected Global Firepower, Hyperlink: https://www.globalfirepower.com/nato-projected-firepower.php (Last visit: 25.01.2023).

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As expected from subchapter 4.3.3.1, the 2022 Statista confirms the dominance of NATO's 'capable' air domain capabilities across all categories. In contrast, the 2022 NATO Projected Global Firepower dataset provides the reverse situational picture, thus confirming the importance of the individual NATO member states committing their assets to NATO. A quick glance at the ratios between NATO and Russia suggest that the transatlantic alliance would need to commit 15-20 percent instead of ten percent as assumed by the Global Firepower in order to reach partial or full parity with the Russian Aerospace Forces that scenario.

4.4.3.2 Land domain/effects capabilities

The field of land domain operations has been the 'bread-and-butter' business for NATO in all decades since its founding in 1949. While the transatlantic alliance's main task in the Cold War was to repel a full-scale military invasion of the Warsaw Pact and Soviet Union, primarily along the inner-German border.[1067]

After the Cold War faded out from existence, the defence planners in NATO's member states were fast to draw down much of the conventional force posturing as the defence expenditure and armed forces personnel numbers in subchapter 4.4.3 indicated. Despite the rapid reduction in forces, a certain level of mistrust between the West and the former Eastern bloc (particularly the Soviet Union/Russia) persisted with a view to the strategic balance of the different conventional forces in Europe. Subchapter 4.2.2 has highlighted the particular negotiations between the different countries in the Euro-Atlantic region that quite quickly concluded in the 1990 CFE Treaty that reinforced the signature states' efforts for conventional disarmament in warfare-critical capabilities (especially from the large land force formations, such as tanks, artillery, or armoured personnel carriers).

Inside NATO, defence planning in the post-Cold War era became increasingly multinational by adapting the old military structures to a new politico-military environment with a stronger focus on crisis management operations that require smaller and more flexible rapid reaction forces that are deployable to regions beyond NATO member states' territories.[1068]

As prominently described in subchapter 4.4.2.2 and 4.4.2.3, NATO's joint efforts in creating a strong land-based multinational force component in the form of the NATO Response Force (NRF) began to blossom after the first decade of the post-Cold War era and grew in view of the lessons learned by the time that the second decade of the post-Cold War era concluded.

[1067] Wallander, C. (2000): Institutional Assets and Adaptability: NATO after the Cold War, pp. 715 f.
[1068] McCalla, R. (1996): NATO's persistence after the Cold War, pp. 448 f.

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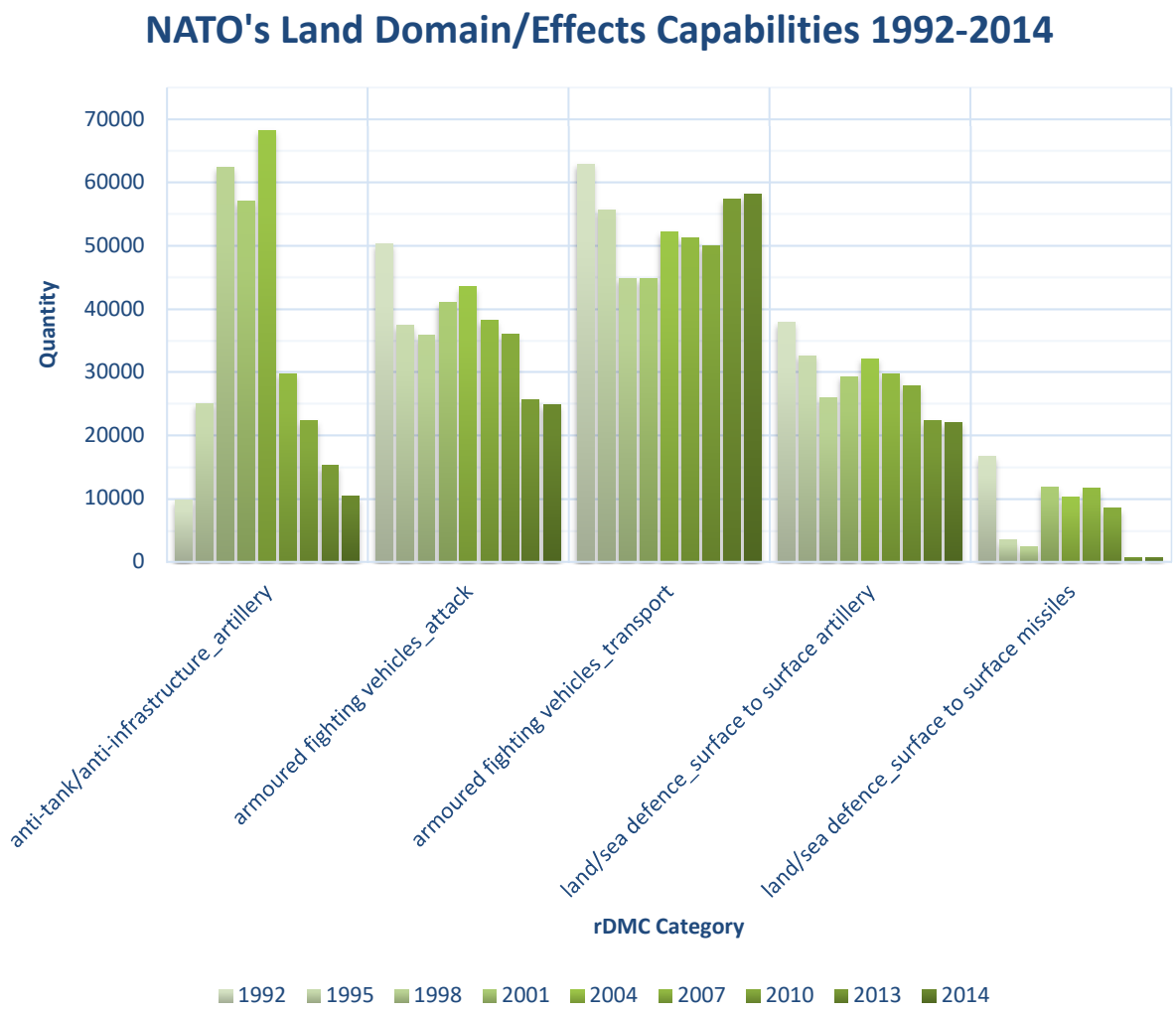
From a U.S. perspective, a fixation on multinational force formations for tackling military crises and conflicts cannot, however, replace national efforts to develop, deploy and sustain military capabilities from the land domain/effects field.

> "Regardless of the **reluctance of some NATO allies** to take an interest in funding their own defense, if the **United States is to continue to safeguard its vital interests in Europe**, it is essential to pay continued close attention **to conventional Landpower**. […]. In short, being prepared for irregular warfare is important, but **maintaining sufficient Landpower to deter adversaries effectively is essential**." (Giles)[1069]

In this sense, the examination of NATO's land domain capabilities provides essential insight into the robustness of the NATO deterrence and defence posture vis-à-vis major land power, such as Russia.



[1069] Rogovoy, A./Giles, K. (2015): A Russian View on Landpower, p. 14, Hyperlink: https://apps.dtic.mil/sti/pdfs/ADA617190.pdf (Last visit: 21.01.2023).

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Figure 18: NATO's land domain/effects capabilities 1992-2014, triennially compiled data plus 2014[1070] [own illustration]

Similar to NATO's rDMC air domain categories analysis, the land domain/effects capabilities show a few irregularities, such as the massive increase in land/sea defence_surface to surface missiles from the year 1998 to 2001. In addition, anti-tank/anti-infrastructure_artillery quantity from around 10.000 units (1992) did grow to a total of app. 62.000 units (1998) and continued slightly before beginning a continuous decrease from 2007 onward. Given that the first massive rise was not due to any NATO enlargement, it can only be assumed that the data definition in the IISS MB with the subsequent counting of equipment had changed to a new methodology. Also, it cannot be excluded that the rDMC was missing either data or readjusted definitions that types of equipment.

Furthermore, and as remarked in subchapter 4.3.3.2, the land/sea defence_surface to surface artillery and land/sea defence_surface to surface missiles represent dual-origin categories, namely land- and sea-launched weaponry. Nevertheless, it is assumed that the largest part of those two capability categories addressed are mainly influenced by equipment of the land-based origin. Nevertheless, the caveat must be set that the respective dual-origin capabilities could belong to naval assets that are e.g., equipped with land-attack cruise missiles or naval guns that can be used to attack targets at land.

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
anti-tank/anti-infrastructure_artillery	**NA**	NA	NA	**NA**	NA	NA	**NA**	NA	NA
armoured fighting vehicles_attack	**1,44:1**	6,2:1	5,92:1	**1,01:1**	0,69:1	0,98:1	**0,89:1**	1,2:1	1,9:1
armoured fighting vehicles_transport	**5,63:1**	12,41:1	9,98:1	**2,98:1**	3,91:1	3,93:1	**3,84:1**	3,23:1	4,94:1
land/sea defence_surface to surface artillery	**1,49:1**	35,3:1	15,38:1	**1,47:1**	1,2:1	1,19:1	**1,04:1**	3,31:1	3,43:1
land/sea defence_surface to surface missiles	**417,5:1**	NA	7,58:1	**59,16:1**	50,84:1	57,89:1	**42,15:1**	2,92:1	2,88:1

Table 75: NATO:Russia Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[1071] [own calculation]

[1070] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

[1071] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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First of all, it should be noted that the rDMC did not contain any data for Russia's anti-tank/anti-infrastructure_artillery. Therefore, no calculation for a ratio with NATO's respective quantities could be conducted. Furthermore, the unusually high ratios for land/sea defence_surface to surface missiles suggest either erroneous or missing data in the rDMC dataset.

In regard to the analysis of the data, the initial-post Cold War era situational picture showed that NATO was 'capable' in the four measurable categories. In regard to the time after the first decade of the post-Cold War era, a general downward trend in all of these four categories could be measured (with a marginal decrease of land/sea defence_surface to surface artillery).

For the second decade of the post-Cold War era, NATO was only credible in three of the four measurable categories. A comparison between the first- and second-decade results shows that NATO increased its capability in the armoured fighting vehicles_transport category, which represents an important capability for, *inter alia*, rapid deployment and movement of troops in crisis management operations, whereas the category armoured fighting vehicles_attack, which also includes heavy main battle tanks, has dropped from 'capable' directly to 'incapable' in 2010.

	1992	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
anti-tank/anti-infrastructure_artillery	**NA**	NA	NA	**NA**	NA	NA	**NA**	NA	NA
armoured fighting vehicles_attack	**0,76:1**	2,75:1	3,19:1	**0,6:1**	0,42:1	0,57:1	**0,54:1**	0,79:1	1,23:1
armoured fighting vehicles_transport	**3,76:1**	6,46:1	5,41:1	**1,81:1**	2,64:1	2,54:1	**2,2:1**	1,42:1	1,95:1
land/sea defence_surface to surface artillery	**0,97:1**	23,16:1	10,44:1	**1,05:1**	0,88:1	0,88:1	**0,73:1**	2,1:1	2,28:1
land/sea defence_surface to surface missiles	**6,43:1**	NA	0,55:1	**0,86:1**	1,4:1	8,45:1	**1,52:1**	0,78:1	0,85:1

Table 76: NATO-Europe:Russia Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[1072] [own calculation]

In regard to NATO-Europe's capability performance in the initial Cold-War era, the European allies were 'capable' in two categories (armoured fighting vehicles_transport and land/sea defence_surface to surface missiles), 'partial capable' in land/sea defence_surface to surface artillery, and 'incapable in armoured fighting vehicles_attack.

Examining the trends for armoured fighting vehicles_attack after the first and second decade of the post-Cold War era, a consecutive decrease could be identified, thus, NATO-Europe

[1072] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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remained ‘incapable’ in that category. For the that same timeframe, armoured fighting vehicles_transport remained ‘capable.

In the analysis of land/sea defence_surface to surface artillery and land/sea defence_surface to surface missiles, fluctuations in the quantities of the focal years (2001 and 2010 in comparison to 1992) could be identified that might most likely rely on the data. In 2001, land/sea defence_surface to surface artillery of NATO-Europe was ‘capable’ and land/sea defence_surface to surface missiles were ‘incapable’, while in 2010, the data provided a reverse result wherin defence_surface to surface artillery of NATO-Europe became ‘incapable’ and land/sea defence_surface to surface missiles were ‘capable’.

As explained in subchapter 4.3.3.2, the rDMC categories require some matching effort with the alternative datasets’ categories. Since no formal definitions were provided by the alternative datasets, the matching was done with an informed logical comparison of the different categories per dataset.

In this sense, main battle tanks are an essential part of armoured fighting vehicles_attack category, while armoured vehicles contain some of the lighter armoured fighting vehicles_attack, e.g. combat support vehicles for the mechanised infantry, as well as armoured fighting vehicles_transport.

Self-propelled artillery and towed artillery belong to the land/sea defence_surface to surface artillery, whereas self-propelled rocket launchers are naturally part of the land/sea defence_surface to surface missiles category. Lastly, and in a nutshell, self-propelled artillery, towed artillery and self-propelled rocket launchers that cover the indirect fire capabilities encompass only land-based assets.

In order to enhance the precision of the results, the alternative datasets from 2022 Statista and 2022 NATO Projected Global Firepower are forthwith presented.

	2022 Statista based on Global Firepower and SIPRI			*2022 NATO Projected Global Firepower*		
	NATO	*Russia*	*NATO:Russia*	*NATO*	*Russia*	*NATO:Russia*
Main battle tanks	14.682	12.420	1,18:1	1.515	9.315	0,16:1
Armoured vehicles	115.855	30.122	3,85:1	11.653	22.592	0,52:1
Self-propelled artillery	5.040	6.574	0,77:1	504	4.931	0,1:1
Towed artillery	5.495	7.571	0,73:1	578	5.678	0,1:1
Self-propelled rocket launchers	2.803	3.391	0,83:1	292	2.543	0,11:1

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Table 77: Alternate datasets for a NATO:Russia comparison per land domain capability, reference year: 2022[1073] [own description]

In the 2022 Statista, NATO's quantities in main battle tanks and especially armoured vehicles were clearly 'capable', while its assets in the long-range indirect fire categories (self-propelled artillery, towed artillery and self-propelled rocket launchers) were all 'incapable'. Given that the 2022 Statista relays the full aggregate of NATO's capabilities per category vis-à-vis Russia, the Russian armed forces conventional capabilities in the field of indirect fire is truly competitive.

The 2022 NATO Projected Global Firepower dataset provided a very dim result for NATO's land forces, if the individual member states only commit ten percent as expected by Global Firepower. In a nutshell, and under this condition, NATO would not be able to deter a Russian conventional onslaught on the ground.

So, while the large accumulated numbers for NATO favour the transatlantic alliance's core of its ground-based conventional deterrence and defence posture, it strongly depends, yet again, on the large commitments by the individual member states (not only the defender but also the mass of protégés inside the alliance) in order to deter a revisionist Russian challenger.

4.4.3.3 Land close air support domain capabilities

There is not much information available that relate NATO as a particular contributor to the land close air support domain capabilities, except for the support to some of NATO's member states in developing the NH90 medium transport helicopter within the remit of the NH90 Helicopter programme (NAHEMA).[1074]

Nevertheless, this does not mean, that NATO is ignorant of the value of helicopters in modern warfare, but the topic of helicopters does not necessarily make it to the headlines of the coverage of NATO's politico-military capabilities.[1075]

Still, rotary-wing aircraft are a valuable part of modern warfare that enable close air support through air-to-ground attacks as well as the rapid transportation and deployment of air assault

[1073] Compare: Statista (2022): Comparison of the military capabilities of NATO and Russia as of 2022, Hyperlink: https://www.statista.com/statistics/1293174/nato-russia-military-comparison/ (Last visit: 25.01.2023); with: GFP (2022): 2022 NATO Projected Global Firepower, Hyperlink: https://www.globalfirepower.com/nato-projected-firepower.php (Last visit: 25.01.2023).

[1074] NATO (2022): NATO agencies, Hyperlink: https://www.nato.int/cps/en/natohq/topics_66470.htm (Last visit: 12.02.2023).

[1075] See for example the study on helicopters' standardisation, in: NATO-JAPCC (2012): Enhancing NATO's Operational Helicopter Capabilities, pp. 1-43, Hyperlink: https://www.japcc.org/wp-content/uploads/Helicopter_Capabilities_web.pdf (Last visit: 12.02.2023).

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troops across a geographically wide parameter or areas that are difficult to reach for vehicles on the ground.

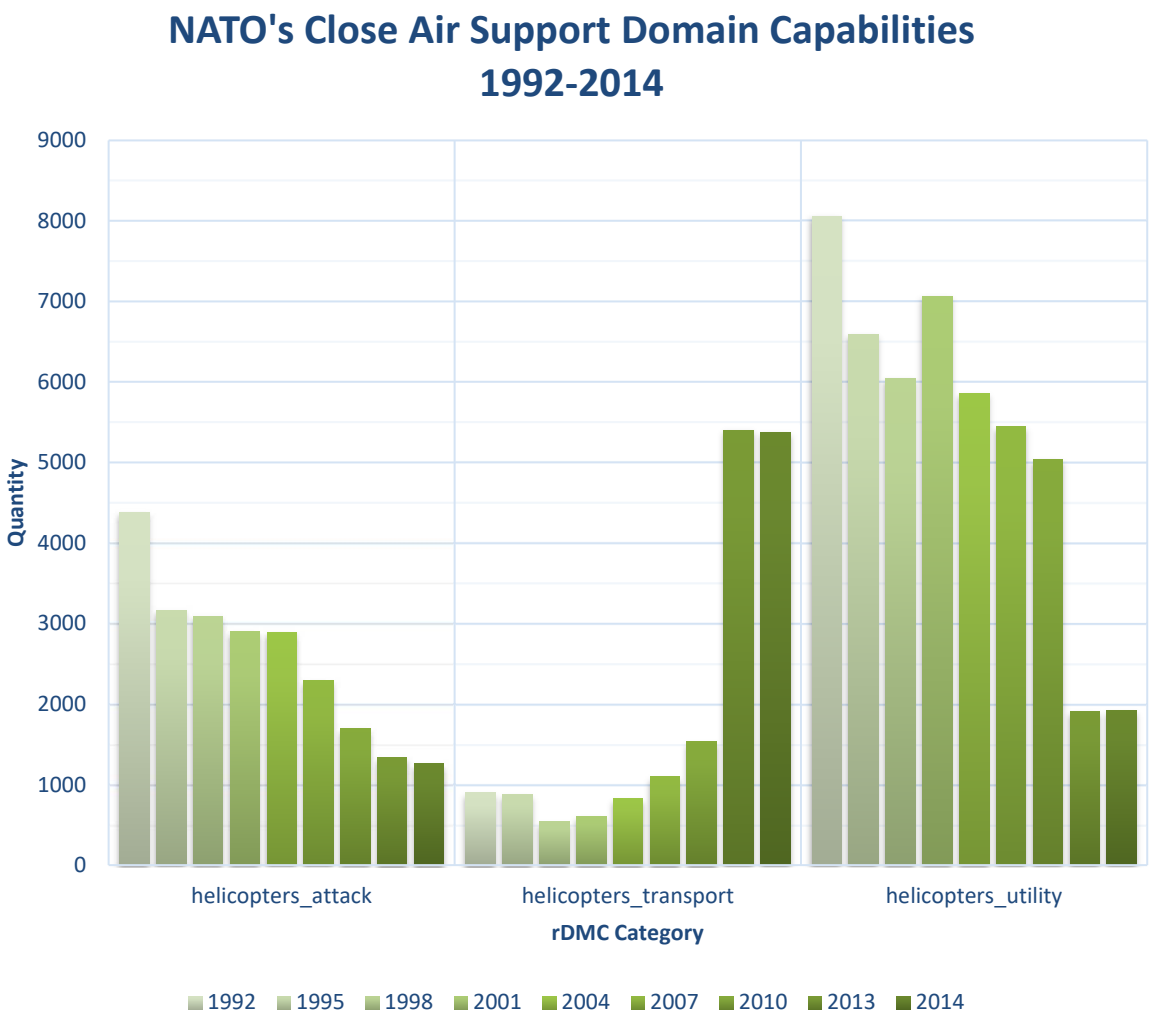

Figure 19: NATO's land close air support capabilities 1992-2014, triennially compiled data plus 2014[1076] *[own illustration]*

In regard to the rDMC dataset for the three types of helicopters that were chosen for the analysis of land close air support capabilities, the data can be considered as largely consistent. Following the review of Figure 19, it is assumed that for the years 2013 and 2014, the sudden increase in helicopters_transport while helicopters_utility decreased to a comparable amount in both years could be explained by a change in the IISS MB's definition that moved certain all-purpose utility helicopters to the transport helicopters category.

[1076] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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Russia:NATO MilCap Ratio	***1992***	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
helicopters_attack	**3,03:1**	2,58:1	1,58:1	**2,69:1**	3,25:1	6,15:1	**1,93:1**	3,55:1	2,13:1
helicopters_transport	**0,68:1**	0,64:1	7,71:1	**76,13:1**	11,23:1	1,45:1	**2,3:1**	7,74:1	7,83:1
helicopters_utility	**13,89:1**	32,97:1	74,62:1	**NA**	NA	90,73:1	**71,96:1**	91,1:1	62:1

Table 78: NATO:Russia Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[1077] [own calculation]

Throughout the period of examination (1992, 2001, 2010), NATO was 'capable' in helicopters_attack, but with a decreasing trend. The helicopters_transport category shows a data artefact for 2002, but a quick glance at the other reference data years, it can be said that NATO became 'capable' in that category since 1998 onward.

Lastly, the results from the helicopters_utility also appear to be highly sensitive to the assignment of helicopters to the different categories of helicopters as given in the different editions of the IISS MB.

Russia:NATO-Europe MilCap Ratio	***1992***	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
helicopters_attack	**0,47:1**	0,9:1	0,55:1	**0,92:1**	1,12:1	2,51:1	**0,53:1**	1,26:1	0,59:1
helicopters_transport	**0,49:1**	0,49:1	6,01:1	**62,38:1**	6,68:1	0,67:1	**1,65:1**	2,75:1	2,74:1
helicopters_utility	**4,66:1**	9,52:1	21,84:1	**NA**	NA	37,72:1	**27,53:1**	44,81:1	29,48:1

Table 79: NATO-Europe:Russia Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[1078] [own calculation]

For NATO-Europe, the situation picture regarding the three types of rotary-wing aircraft under examination looks very similar, *albeit* with two exceptions. (1) NATO-Europe became only 'partial capable' in helicopters_attack in one of the key years of examination (2001), and (2) Russia did not have any data on helicopters_utility in 2001, which prevents any statement on the ratio result in this category of that year.

Mirroring the approach of the previous capability subchapters, the 2022 Statista and 2022 NATO Projected Global Firepower datasets provide further information that can provide a more

[1077] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

[1078] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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reliable situational picture. As explained in subchapter 4.3.3.3, the alternative datasets only provide a sum of all helicopters and a subtotal for the Attack Helicopters, which means that quantity relations for Transport and Utility rotary-wing aircraft cannot be distinguished in the total numbers of helicopters. For this alternative analysis, the Total Helicopters and Attack Helicopters categories were therefore taken into account.

	2022 Statista based on Global Firepower and SIPRI			*2022 NATO Projected Global Firepower*		
	NATO	*Russia*	*NATO:Russia*	*NATO*	*Russia*	*NATO:Russia*
Total helicopters	8.485	1.543	5,5:1	848	1.157	0,73:1
Attack Helicopters	1.359	544	2,5:1	136	416	0,33:1

Table 80: Alternate datasets for a NATO:Russia comparison per land close air support domain capability, reference year: 2022[1079] *[own calculation]*

A comparison between the 2022 Statista and the 2022 NATO Projected Global Firepower datasets show the divide between aggregate numbers 'on paper' and the ten percent commitment assumption of a military alliance vis-à-vis Russia. It is therefore not surprising that the left-side statistics in Table 76 provide a 'capable' perspective of NATO's land close air support capabilities, while the right side in the same table moves NATO's land close air support capabilities in the 'incapable' field. Thus, the requirement for NATO's member states to ensure significant commitment in military capabilities is further reinforced by the results of the analysis of this subchapter.

4.4.3.4 Maritime domain capabilities

Nothing in NATO's capability landscape inherits a stronger image of inter-state cooperation in foreign, security and defence matters than the cross-oceanic outreach of NATO as a truly transatlantic alliance that unites the two sides of the Atlantic (North America with Canada and especially the U.S. as well as Europe).

For NATO, the Atlantic Ocean was both an identity-fomenting element as well a vital area of maritime operations. Within the remit of the REFORGER exercises, the U.S. navy (and to a lesser extend the UK navy) were providing the lifeline of critical support in case that the Warsaw Pact would to invade Western Europe. From a Soviet perspective, the North Atlantic would have also been the area, wherein nuclear-powered submarines would disrupt North

[1079] Compare: Statista (2022): Comparison of the military capabilities of NATO and Russia as of 2022, Hyperlink: https://www.statista.com/statistics/1293174/nato-russia-military-comparison/ (Last visit: 25.01.2023); with: GFP (2022): 2022 NATO Projected Global Firepower, Hyperlink: https://www.globalfirepower.com/nato-projected-firepower.php (Last visit: 25.01.2023).

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American NATO support while submarines with ballistic missile would deploy in order to close in on the adversary's mainland (in order to cut reaction times following a nuclear first strike or to ensure a capable nuclear retaliation).[1080]

In the aftermath of the Cold War, large-scale troop movement across the North Atlantic were not to be expected from the U.S. as key defender of the transatlantic alliance. Henceforth, NATO's focus for its maritime component of the overall NATO deterrence and defence posture reoriented to supporting out-of-area land operations from the sea and maritime security operations, e.g., in the Western Indian Ocean (in the Gulf of Aden and at the Horn of Africa).[1081]

In regard to maritime military capabilities, NATO does not own its own navy, of course, but within the remit of the maritime NATO Force Structure (NFS), the transatlantic alliance employs four regional flotillas in the Baltic Sea as well as in the Mediterranean Sea.

These regional maritime presences are known as Standing NATO Maritime Groups (SNMG1 and SNMG2) and Standing NATO Mine Countermeasures Groups (SNMCMG1 and SNMCMG2), which consist of permanently available national contributions by the maritime member states of NATO that execute different tasks (maritime surveillance and patrolling, show of force or more specialised duties). In addition, NATO can draw upon these formations in order to conduct different maritime operations.[1082]

[1080] For an overview of the U.S. naval perspective on the Cold War, see: Swartz, P. (2021): Evolution of U.S. Navy Roles in NATO: Always an Important Part of a Larger Whole, pp. 37-88, Hyperlink: https://www.cna.org/reports/2021/08/Evolution-of-US-Navy-Roles-in-NATO-Always-an-Important-Part-of-a-Larger-Whole.pdf (Last visit: 13.02.2023).

[1081] NATO (2022): Operations and missions: past and present, Hyperlink: https://www.nato.int/cps/en/natohq/topics_52060.htm (Last visit: 18.10.2022).

[1082] For an overview on NATO's maritime activities, see: NATO (2023): NATO's maritime activities, Hyperlink: https://www.nato.int/cps/en/natohq/topics_70759.htm (Last visit: 13.02.2023).

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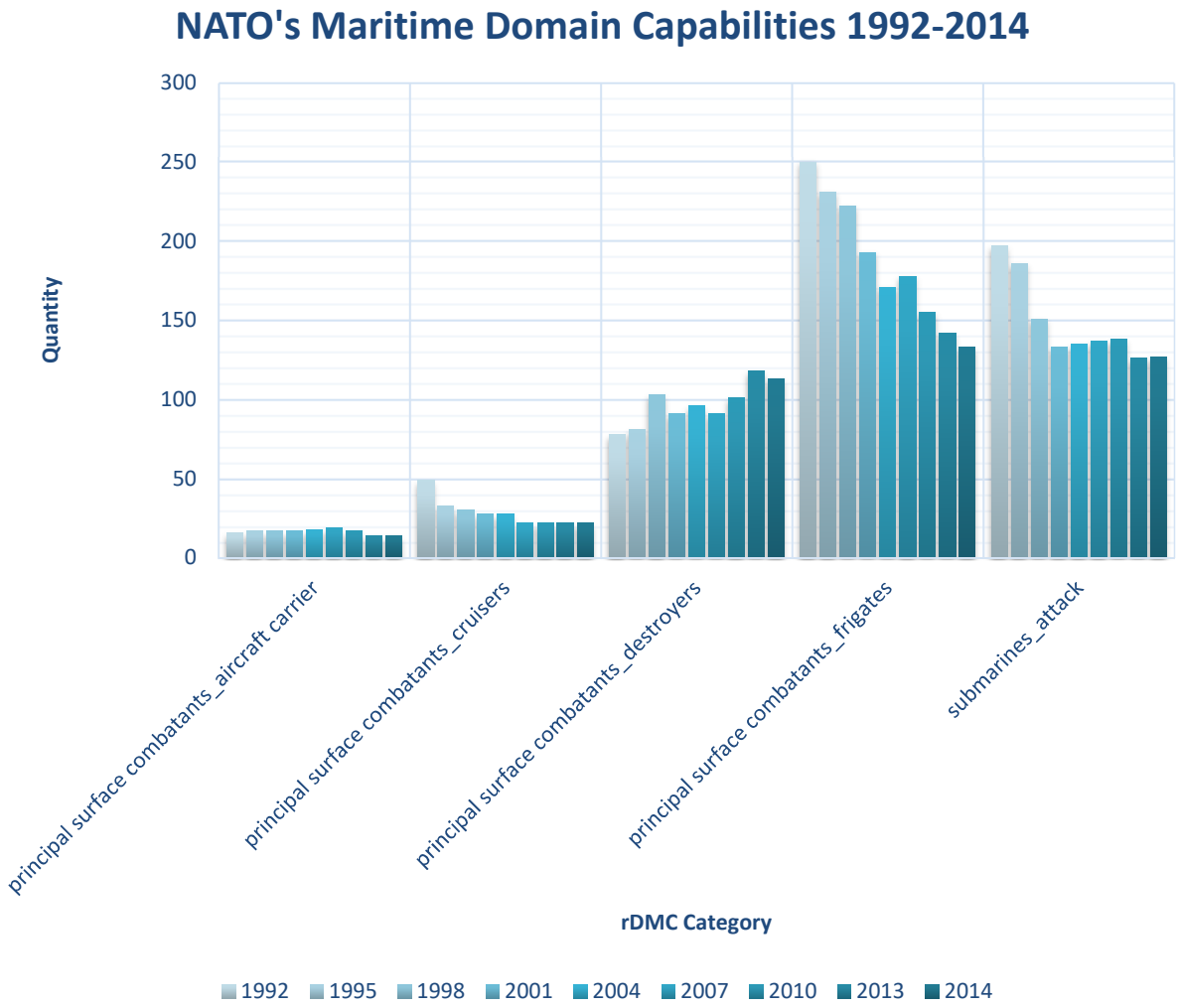

Figure 20: NATO's maritime capabilities 1992-2014, triennially compiled data plus 2014[1083] *[own illustration]*

Considering the rDMC dataset on principal surface combatants and attack submarines, the aggregate overview for NATO provides a relatively 'natural' situational picture with a few exemptions due to outlier statistics (e.g., for 2004, Romania's frigate count was 111 vessels instead of just one vessel. The numbers in 2001 and 2007 were correct again).

In view of the geographic location of NATO's member states of the Cold War era, the majority of Western Europe's naval forces were already included from the very beginning of the post-Cold War era. Therefore, it is expected that the three NATO enlargements (1999, 2004, 2010) did not bring much naval power into the alliance (except the regional fleets of Poland, Romania, and Bulgaria), while some new members were completely land-locked, anyway.

[1083] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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Russia:NATO MilCap Ratio	***1992***	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
principal surface combatants_aircraft carrier	**4:1**	8,5:1	17:1	**17:1**	18:1	19:1	**17:1**	14:1	14:1
principal surface combatants_cruisers	**1,48:1**	2,36:1	1,76:1	**4:1**	4,67:1	2,44:1	**4,4:1**	4,4:1	4,4:1
principal surface combatants_destroyers	**3:1**	3,68:1	7,92:1	**5,35:1**	6,86:1	4,79:1	**11,22:1**	6,56:1	6,28:1
principal surface combatants_frigates	**1,94:1**	2,26:1	8,88:1	**4,29:1**	7,43:1	4,24:1	**5,74:1**	11,83:1	11,08:1
submarines_attack	**1,03:1**	1,36:1	2,19:1	**3,41:1**	2,01:1	3,11:1	**3,83:1**	2,74:1	2,76:1

Table 81: NATO:Russia Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[1084] [own calculation]

It is not surprising, that NATO employed a 'capable' maritime landscape throughout all three examined time periods (1992, 2001, 2010). Depending on the definitions of the ships in accordance with their tonnage, it was already remarked in subchapter 4.1.1.2 that the IISS MB editions vary in their thresholds regarding the different types of vessels.

Furthermore, a look on the NATO-Europe maritime capabilities might be helpful in determining the extend of Europe's dependency on mainly the U.S. as provider of naval assets.

Russia:NATO-Europe MilCap Ratio	***1992***	*1995*	*1998*	***2001***	*2004*	*2007*	***2010***	*2013*	*2014*
principal surface combatants_aircraft carrier	**1:1**	2,5:1	5:1	**5:1**	6:1	7:1	**6:1**	3:1	3:1
principal surface combatants_cruisers	**0,03:1**	0,07:1	0,06:1	**0,14:1**	0,17:1	RUS dom.	**RUS dom.**	RUS dom.	RUS dom.
principal surface combatants_destroyers	**1,12:1**	1,41:1	3,23:1	**1,94:1**	3,07:1	2:1	**4,67:1**	2,94:1	2,67:1
principal surface combatants_frigates	**1,21:1**	1,67:1	6,8:1	**3,24:1**	5,61:1	3,24:1	**4,19:1**	8,75:1	8,5:1
submarines_attack	**0,55:1**	0,74:1	1,19:1	**2:1**	1,15:1	1,7:1	**2,14:1**	1,39:1	1,41:1

RUS dom. = Russia is dominant in that capability/no comparable NATO capability

Table 82: NATO-Europe:Russia Military Capability (MilCap) Ratio 1992-2014, triennially compiled data plus 2014[1085] [own calculation]

Table 78 shows that NATO-Europe was continuously 'capable' in principal surface combatants_destroyers and principal surface combatants_frigates, while it lacked the heavier

[1084] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

[1085] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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armoured and better armed principal surface combatants_cruisers. Since 2007, no European NATO member had any ships left in their inventory that are classified as principal surface combatants_cruisers, thus Russia became dominant in that category).

In view of Russia's weakness in principal surface combatants_aircraft carrier, NATO-Europe was able to sustain a 'capable' naval/air power projection capacity based on few aircraft carriers.

Lastly, in the submarines_attack category, NATO-Europe began to profit from the Russian neglect of its navy and particularly its submarines since the triennial of 1998. As a result, NATO-Europe was rated 'capable' in the years 2001 and 2010 in that category.

Following the established path of informing the outcomes from the rDMC's analysis with the two alternative datasets, a matching activity in regard to the ship categories between those three datasets is required. Mirroring what has been proposed in subchapter 4.3.3.4, total maritime assets cover all those examined vessels plus any other ship of the either NATO or Russia.

Aircraft carriers, destroyers, and frigates can be matched with their respective 'mirror' rDMC categories. And again, corvettes were not considered 'principal surface combatants' in the rDMC, but larger corvettes could have been classified as frigates and were thereby also accounted for in the principal surface combatants_frigates category.

Principal surface combatants_cruisers are not listed separately in the alternative datasets, but are most likely added to the next lower category, i.e., destroyers.

Submarines are related directly to submarines_attack, assuming that no further submarines of a ballistic missile launching nature or other type was subsumed under submarines by the alternative datasets.

Lastly, the alternative datasets also provide a separate entry for Helicopter carriers, which are basically included in the rDMC category principal surface combatants_aircraft carrier. In the analysis below, they are listed separately.

	2022 Statista based on Global Firepower and SIPRI			*2022 NATO Projected Global Firepower*		
	NATO	*Russia*	*NATO:Russia*	*NATO*	*Russia*	*NATO:Russia*
Total naval assets	2.049	605	3,39:1	204	454	0,45:1
Aircraft carriers	17	1	17:1	3	1	3:1
Helicopter carriers	-	-	-	2	0	NATO dom.
Destroyers	112	15	7,47:1	12	11	1,09:1
Frigates	135	11	12,27:1	14	8	1,75:1
Corvettes	56	86	0,65:1	9	65	0,14:1
Submarines	144	70	2,06:1	22	53	0,42:1

NATO dom. = NATO is dominant in that capability/no comparable Russian capability

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Table 83: Alternate datasets for a NATO:Russia comparison per maritime domain capability, reference year: 2022[1086]

The 2022 Statista provides, yet again, the well-known picture of a dominant NATO maritime force with the notable exemption of the comparatively lighter type of corvettes, which could nevertheless be outbalanced with the dominant numbers in the heavier better-armed higher classes (frigates and destroyers).

In partial contrast to that optimistic picture the 2002 NATO Projected Global Firepower dataset shows that NATO would be able to retain its 'capability' in four of the six individual categories. Nevertheless, the lack in the total number of naval assets might open up a window of opportunity for Russia to invalidate NATO's still 'capable' maritime forces through sheer numerical advantage. Furthermore, it cannot be determined on the basis of these numbers if NATO's particular weaknesses in corvettes and especially submarines might pose a considerable thread to its maritime capabilities. Nevertheless, the situational picture for NATO in the maritime domain remains much more positive than the outlook from the other domains examined under subchapter 4.4.3 due to the robustness of the navy of a few decisive NATO member states (first and foremost the U.S.).

4.4.3.5 Nuclear domain capabilities

NATO as a military alliance does not possess nuclear weapons on its own. Therefore, the task of commitment a credible nuclear deterrent remains with those member states that own these weapons of mass destruction. Regarding NATO's capabilities from the nuclear domain, the transatlantic alliance has three members that acknowledged nuclear powers that could principally provide respective commitments to the transatlantic alliance, namely the U.S., the UK, and France.

Taking into account that NATO is a military alliance based on the decision-making mechanism of consensus between all member states, the jointly agreed NATO nuclear policy for the transatlantic alliance for the post-Cold War era was formulated on the basis of the 1991 NATO Strategic Concept and consecutively extended by the two subsequent strategic concepts throughout the post-Cold War era. In this sense, NATO's members agreed to the following terms of reference for the alliance's strategic nuclear deterrent.

[1086] Compare: Statista (2022): Comparison of the military capabilities of NATO and Russia as of 2022, Hyperlink: https://www.statista.com/statistics/1293174/nato-russia-military-comparison/ (Last visit: 25.01.2023); with: GFP (2022): 2022 NATO Projected Global Firepower, Hyperlink: https://www.globalfirepower.com/nato-projected-firepower.php (Last visit: 25.01.2023).

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> "The **supreme guarantee** of the security of the Allies is provided by the **strategic nuclear forces** of the Alliance, **particularly those of the United States**; the **independent strategic nuclear forces** of the **United Kingdom** and **France**, which have a **deterrent role of their own**, **contribute to the overall deterrence** and security of the Allies." (1991/1999/2010 NATO Strategic Concepts)[1087]

Further taking into account that the U.S. is attributed the role of the nuclear-armed defender in the integrated conventional/nuclear deterrence game, the question of NATO's strategic nuclear deterrent is addressed in subchapter 4.5, which is dedicated to analysis of the credibility and capability of the U.S. extended nuclear deterrence for NATO's member states.

As a consequence, there are only two questions that remain to be answered from a capability perspective in this subchapter:

(1) What are these independent strategic nuclear forces of France and the UK, which has been mentioned in the statement above? and

(2) what is the status of the non-strategic nuclear weapons that the U.S. has forward deployed in selected allies from the Cold War till today (2023).

There are two necessary remarks at this point that could answer potential immediate follow-on question regarding the impact of the strategic deterrence of the UK and France on the integrated conventional/nuclear deterrence game. From the theoretical perspective, the U.S. plays the role of nuclear-armed defender, even though France and the UK could theoretically be defender as well due to their national nuclear arsenals. However, they are treated as *quasi*-protégés because of the individual conditions of each state's nuclear arsenal.

Regarding France, the country that was led by former French General De Gaulle at the time has decided to withdraw from NATO's military command structure (not the political side of the transatlantic alliance!) in 1966 for reasons that are not further examined in this subchapter. While the post-Cold War French government under Nicolas Sarkozy reversed that decision in 2009 with some caveats. Subsequently, one of those caveats are that France specifically would to remain outside NATO's Nuclear Planning Group (NPG) in order to underline the sovereign independence of the French national nuclear arsenal.[1088] In view of the missing direct linkage

[1087] Paragraph 54 in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022); paragraph 62 in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022); and paragraph 18 in: NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', pp. 14, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 03.12.2022).

[1088] For reference on France's self-understanding in NATO, see: Permanent Representation of France to NATO (2019): France and NATO: presentation, Hyperlink: https://otan.delegfrance.org/France-and-NATO-presentation-1217 (Last visit: 02.12.2022).

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between NATO and France as nuclear power, it was determined that France does not qualify as an appropriate nuclear-armed defender that provides an extended nuclear deterrent to the alliance with protégés.

The UK is part of NATO's military command structure as well as the NATO NPG. Its national nuclear policy determines that the British strategic nuclear deterrent is assigned to NATO in line with the jointly agreed policies that do not exclude (!) first-use of nuclear weapons. However, a critical caveat that casts some doubt whether the UK's nuclear arsenal would be sufficiently 'capable' to provide adequate extended strategic nuclear deterrence for NATO: The UK pursues a 'minimal credible nuclear deterrence' policy. Until 1998, the deterrent was based on air-delivered nuclear gravity bombs, surface ship-launched nuclear missiles and submarine-launched ballistic missiles (SLBMs). By 1998, the only nuclear weapon left in the UK arsenal became the Trident SLBM system that was deployed aboard four submarines. The British policy foresees a continuous presence of one submarine at sea at any time.[1089]

The submarines in use throughout the post-Cold War era belong to the Vanguard-class that can carry up to 16 Trident D5 SLBMs[1090] with a theoretical payload of 12 MIRV warheads with a yield of 100-120 kiloton TNT equivalent a piece.[1091]

In regard to the total number of missiles and warheads, the British government does largely not publish formal information in order to ensure a strategic ambuity regarding the scope of its nuclear potential. 2022 research briefing for the UK House of Commons, which was published, estimated a Cold War peak of the UK's nuclear warheads at 520 units. At the time of the 1998 Strategic Defence Review, the number of warheads was estimated to be 280 units. The next reduction came following the 2006 White Paper on the Future of the Nuclear Deterrent with a warhead's estimate at 225 units, which in 2010, the UK government publicly confirmed as its current stock at the time.

For the missile systems aboard the UK's submarines, the 1998 Strategic Defence Review announced the reduction from 96 to 48 warheads per submarine per patrol round. This would mean that each of the 16 Trident D5 would be reduced from a six MIRV warheads to a three MIRV warheads payload, under the condition that all available missile tubes in the submarine are filled. That the missile capacity represents a counting challenge was shown by the 2010 Strategic Defence and Security Review (PDF) that announced the reduction of missile tubes

[1089] Mills, C. (2022): Nuclear weapons at a glance: United Kingdom, pp. 7-14, Hyperlink: https://researchbriefings.files.parliament.uk/documents/CBP-9077/CBP-9077.pdf (Last visit: 13.02.2023).
[1090] Missile Threat (2021): Trident D5, Hyperlink: https://missilethreat.csis.org/missile/trident/ (Last visit: 27.12.2022).
[1091] Naval Technology (2012): SSBN Vanguard Class, Hyperlink: https://www.naval-technology.com/projects/vanguard-submarine/ (Last visit: 13.02.2023).

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filled per submarine to be reduced from 12 to eight missiles together with a smaller warhead reduction per submarine from 48 down to 40.[1092]

When these overall quantities in the UK's post-Cold War era nuclear arsenal (submarines, missiles, warheads) are compared to Russia's strategic nuclear arsenal in accordance with subchapter 4.3.3.5, the UK would be truly 'capable' to execute a limited nuclear strike against Russia's forces and territory, but in view of the vast nuclear potential of Russia's nuclear triad, a sole UK extended nuclear deterrence for NATO remains highly doubtful in both its credibility and capability to deter Russia.

Nevertheless, and regardless if France has not been part of the nuclear planning of NATO and the UK has just a minimum nuclear deterrent, NATO has continuously stressed the value of these nuclear arsenals for the non-nuclear allies as well as the alliance in general.

> "The supreme guarantee of the security of the Allies is provided by the strategic nuclear forces of the Alliance, particularly those of the United States; the **independent strategic nuclear forces** of the **United Kingdom** and **France**, which have a **deterrent role of their own**, **contribute to the overall deterrence** and security of the Allies." (1991/1999/2010 NATO Strategic Concepts)[1093]

In this sense and in deviation from the game-theoretic framework, it must be assumed that the NATO as 'collective' is nevertheless capable in the nuclear domain. This does not mean that either France or UK would be able to shoulder the burden that the U.S. does in regard to extended nuclear deterrence. However, from a pure capability-perspective, the reality is that the two mentioned powers are not defenders but nuclear-armed protégés. Taking into account that this does not change the role of NATO but only provides one more capability in the for the capability alliance, the impact is not critical for the outcome of the game.

After having answered the question on the strategic nuclear deterrence of the France and the UK, the remaining question refers to the non-strategic nuclear weapons that the U.S. had forward deployed to Europe in the Cold War.

From a theoretic perspective, the defender is always conventionally and nuclear-armed states, while protégés do not have nationally owned nuclear weapons at their disposal (notwithstanding

[1092] Mills C. (2022): Nuclear weapons at a glance: United Kingdom, p. 7-12, Hyperlink: https://researchbriefings.files.parliament.uk/documents/CBP-9077/CBP-9077.pdf (Last visit: 13.02.2023).

[1093] Paragraph 54 in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022); paragraph 62 in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022); and paragraph 18 in: NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', pp. 14, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 03.12.2022).

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special cases like France or the UK). In order to overcome this lack of capability in the protégés and reducing the workload for the defender's forces by the conduct of smaller scale nuclear operations, the U.S. entertains a NATO nuclear sharing arrangement with European NATO allies since the Cold War. In this arrangement, the protégé non-nuclear European allies provide the dual-capable aircraft, which are used to deliver U.S. non-strategic nuclear weapons (predominantly nuclear gravity bombs) to their indicated targets.

The agreement to activate and deploy those non-strategic nuclear weapons follows a political decision by NATO's highest determined by NATO's Nuclear Planning Group (NPG) as the central steering body for the more operational questions on the use of nuclear weapons within the remit of NATO. Until formal release of nuclear weapons by the U.S. President, those weapons remain in the full custody of U.S. military forces. Therefore, those allies actively contributing to NATO Nuclear Sharing are not considered nuclear-armed states and remain protégés. [1094]

Following the end of the Cold War, the trend in U.S. non-strategic nuclear policy has been a soft one:

> "[…] NATO has **unilaterally reduced thousands of nuclear weapons** over the past decade, in addition to **elimination an entire class of U.S. and Soviet weapons** as called for in the Treaty on Intermediate Range Nuclear Forces." (1991 NSS)[1095]

As a result of the changes in the politico-military environment in central Europe, particularly due to the disappearance of the Warsaw Pact as immediate adversary, against whom non-strategic nuclear weapons would have to be used, the U.S. was quick to announce concrete disarmament and withdrawal plans of these types of weapons.

> "Changes in Europe have now allowed us to **forego plans to modernize our LANCE missiles and nuclear artillery shells** and we will work to implement the commitments of the **London Declaration with respect to short-range nuclear weapons currently deployed in Europe**." (1991 NSS)[1096]

An initiative for mutual reductions in non-strategic nuclear weapons were established by the Presidents of the two superpowers at the time, Mikhail Gorbachev and George H. Bush. It was

[1094] For reference, see: NATO (2022): NATO's Nuclear Sharing Arrangements – Factsheet, pp. 1-2, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/2022/2/pdf/220204-factsheet-nuclear-sharing-arrange.pdf (Last visit: 22.10.2022).

[1095] Historical Office (1991): National Security Strategy of the United States, August 1991, pp. 26. Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss1991.pdf?ver=3sIpLiQwmknO-RplyPeAHw%3d%3d (Last visit: 01.12.2022).

[1096] Historical Office (1991): National Security Strategy of the United States, August 1991, pp. 26. Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss1991.pdf?ver=3sIpLiQwmknO-RplyPeAHw%3d%3d (Last visit: 01.12.2022).

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estimated that between 2001-2006 the U.S. had withdrawn 85 percent of its Cold War non-strategic nuclear arsenal from Europe. As of 2019, further estimates tell that around 200 non-strategic nuclear gravity bombs with a single warhead yield of 0.3-170 kiloton TNT equivalent remained at six airbases (one airbase each in Belgium, the Netherlands, Germany, Turkey, as well as at two airbases in Italy), while Russia was assumed to retain around 2.000 non-strategic nuclear weapons at the time.[1097]

Despite the disappearance of the unifying (nuclear and large-scale conventional) threat of the Warsaw Pact and the Soviet Union, NATO's member states reiterated their mutual agreement that non-strategic nuclear weapons remained not only an important cornerstone of the alliance's general nuclear deterrent – which could have been questioned particularly in the 1990s in view of the strategic distance between NATO's territory and Russia as nuclear-armed challenger –, but also as an instrument of politico-military cohesion inside the transatlantic alliance. Despite the reductions in the non-strategic nuclear arsenal forward deployed by the U.S. to Europe, no further changes to the *status quo* were undertaken by NATO or the U.S.

While exact numbers of Russia's post-Cold War era non-strategic nuclear weapons, including their composition regarding air bombs, field artillery or short-range ballistic missiles, is full of gaps, it is assumed that NATO's non-strategic nuclear arsenal provides no real match for Russia's likewise capabilities. Furthermore, the question of the usefulness of non-strategic nuclear weapons for NATO in view of the increasing role of high-precision guided munitions (PGM) in modern warfare, which direct pinpoint damage to target while reducing collateral damage (especially in comparison to even smaller nuclear weapons), might not change the mindset inside the transatlantic alliance of non-strategic nuclear weapons as an instrument for political cohesion. Nevertheless, when PGM is principally available, one can assume that non-strategic nuclear weapons will probably not play a major role in NATO's defence planning that they had at the time of the Cold War.[1098]

4.4.4 Interim conclusion: NATO's deterrence and defence posture

The central aim of subchapter 4.4 was the comprehensive game-oriented analysis of NATO's deterrence and defence posture in three points of examination (see below). For this endeavour, subchapter 4.4.2 focussed on the credibility of NATO's posture in accordance with the

[1097] Credi, O. (2019): US Non-Strategic Nuclear Weapons in Europe: Necessary or Obsolete?, pp. 1 f.. Hyperlink: https://www.jstor.org/stable/resrep19821 (Last visit: 13.02.2023).
[1098] US Congressional Research Service (2022): Nonstrategic Nuclear Weapons, pp. 15-32, Hyperlink: https://sgp.fas.org/crs/nuke/RL32572.pdf (Last visit: 06.01.2022).

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qualitative methodology of subchapter 4.1.1.2, while subchapter 4.4.3 provided an overview on Russia's posture in regard to its key military capabilities examined in line with qualitative methodology of subchapter 4.1.1.2.

Recalling the results from the credibility-related analysis from subchapter 4.4.2,

(4) The 1991 NATO Strategic Concept for initial post-Cold War era (1992) was identified as **inconclusive**.

(5) The 1999 NATO Strategic Concept after the first decade of the post-Cold War era (2001) has been '**soft**', and

(6) The 2010 NATO Strategic Concept after the second decade of the post-Cold War era (2010) was determined to be **inconclusive**.

The individual results of each of the four indicators in line with Table 59 from subchapter 4.4.2.1 are displayed in Table 84 below:

	Initial post-Cold War era (1992)	*After the first decade of the post-Cold War era (2001)*	*After the second decade of the post-Cold War era (2010)*
1. Indicator	Hard	Soft	Soft
2. Indicator	Soft	Soft	Soft
3. Indicator	Hard	Soft	Hard
4. Indicator	Soft	Soft	Hard

Table 84: Overview of the deterrence and defence posture analysis for NATO from the subchapters 4.4.2.2, 4.4.2.3, and 4.4.2.4 [own description]

Recalling the results from the capability-related analysis performed in the subchapter 4.4.3, the compilation in Table 85 provides a high-level overview per individual domain. For the purpose of analysing Russia as well as proving the value of this analytical instrument, the information in Table 85 and 86 are based on the rDMC dataset only in order to avoid any confusion regarding the definition of the different categories.

The coding of the overview table is a/b/c/d whereof a is 'capable, b is 'partially capable', c is 'non-capable' and d is 'NA'. The numbers indicate the sum of capabilities belonging to each of the categories, whereas '-' means nil.

Military Capability	*Initial post-Cold War era (1992)*	*After the first decade of the post-Cold War era (2001)*	*After the second decade of the post-Cold War era (2010)*
Air domain	1/-/2/1	2/-/1/1	2/-/1/1
Land domain/effects	4/-/-/1	4/-/-/1	3/-/1/1
Land close air support domain	2/-/1/-	2/-/1/1	3/-/-/-
Maritime domain	5/-/-/-	5/-/-/-	5/-/-/-
Nuclear domain	Capable	Capable	Capable

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Table 85: Overview of NATO's capability-based deterrence and defence posture derived from the NATO:Russia comparison in subchapter 4.4.3.2, 4.4.3.3, 4.4.3.4, 4.4.3.5, and 4.4.3.6 [own presentation]

As explained in subchapter 4.4.3.6, due to NATO's robust strategic nuclear arsenal with three nuclear-armed member states, the alliance counted as capable in the nuclear domain throughout the period of examination.

Derived from this capability-based analysis of a NATO:Russia comparison, NATO provides the following capability performance:

(4) In the Initial post-Cold War era (1992), NATO was 'capable' in 13 military capabilities,

(5) after the first decade of the post-Cold War era (2001), NATO was 'capable' in 14 military capabilities,

(6) after the second decade of the post-Cold War era (2010), NATO was 'capable' in 14 military capabilities,

Military Capability	*Initial post-Cold War era (1992)*	*After the first decade of the post-Cold War era (2001)*	*After the second decade of the post-Cold War era (2010)*
Air domain	1/-/2/1	2/-/1/1	2/-/1/1
Land domain/effects	2/1/1/1	2/-/2/1	2/-/2/1
Land close air support domain	1/-/2/-	1/1/-/1	2/-/1/-
Maritime domain	3/-/2/-	4/-/1/-	4/-/1/-
Nuclear domain	Capable	Capable	Capable

Table 86: Overview of NATO-Europe's capability-based deterrence and defence posture derived from the NATO-Europe:Russia comparison in subchapter 4.4.3.2, 4.4.3.3, 4.4.3.4, 4.4.3.5, and 4.4.3.6 [own presentation]

Given that NATO-Europe contains two nuclear-armed powers (France and the UK) and that the extended U.S. nuclear deterrence is not excluded by the focus on Europe's conventional deterrence and defence posture, NATO-Europe was set as 'capable' in the nuclear domain.

Derived from this capability-based analysis of a NATO-Europe:Russia total comparison in Table 86, NATO-Europe provides the following capability performance:

(4) In the Initial post-Cold War era (1992), NATO-Europe was 'capable' in eight military capabilities and 'partially capable' in one capability,

(5) after the first decade of the post-Cold War era (2001), NATO-Europe was 'capable' in ten military capabilities and 'partially capable' in one capability,

(6) after the second decade of the post-Cold War era (2010), NATO-Europe was 'capable' in 11 military capabilities.

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Table 87 below summaries the end results of the comprehensive analysis of NATO's deterrence and defence posture threat posture based on the qualitative and quantitative methodology from the subchapter 4.1.2.1 and 4.1.2.2. At this point, it should be stressed again that the results from the capability-based analysis are derived from incomplete data and very approximated, which is a common issue also found in capability-related analysis of NATO's military capabilities that also draws upon the rDMC dataset in subchapter 4.3.3). The end results in Table 88, conclude subchapter 4.4.

	Initial post-Cold War era (1992)	*After the first decade of the post-Cold War era (2001)*	*After the second decade of the post-Cold War era (2010)*
NATO's Deterrence and Defence Posture – Capability - Credibility	Inconclusive	Soft	Inconclusive
NATO's Deterrence and Defence Posture – Capability against Russia	Capable (13)	Capable (14)	Capable (14)
NATO-Europe's Deterrence and Defence Posture – Capability against Russia	Capable (8) Partially Capable (1)	Capable (10) Partially Capable (1)	Capable (11)

Table 87: NATO's deterrence and defence posture in the post-Cold War era based on the credibility/capability analysis from subchapter 4.1 [own description]

Following the empirical analysis of NATO as the collective of protégé plus the conventional part of the defender in the integrated conventional/nuclear deterrence game, the second of the three hypotheses can now be tested.

Recalling the specific hypothesis from subchapter 4.1 below:

> **Hypothesis 2**: The military alliance consisting of a protégé and conventional side of the defender decrease the military alliance's deterrence and defence posture in terms of credibility and capability to a minimum that corresponds alliance's agreed minimum military security requirement.

Response: The hypothesis <u>can be confirmed for the credibility</u> of NATO's deterrence and defence posture, but <u>cannot be confirmed for the capabilities</u> of NATO's military capabilities.

Justification: By comparing the empirical results for the period of the initial post-Cold War era (Year: ~1992) over the end of the first decade of the post-Cold War era (Year: ~2001) to the end of the second decade of the post-Cold War era (Year: ~2010), NATO moved from inconclusive through a soft to an inconclusive posture.

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In the initial post-Cold War era (Year: ~1992), NATO took an inclusive stance in the face of political uncertainty after the collapse of the Eastern bloc. At that time, NATO-Europe's military capabilities (even without the U.S. capabilities) were conventionally sufficient to deter Russia's soft threat posture.

At the end of the first decade of the post-Cold War era (Year: ~2001), NATO had just completed its first Eastern enlargement (in 1999) by accepting three new east European members to the alliance. Meanwhile, as the number of crisis operations increased, the military strategic thinking within the transatlantic alliance began to shift away from territorial defence towards out-of-area interventions (e.g., on the Balkans). Thus, deterrence and defence were not the main goal of the transatlantic alliance at the time and considerable reforms of the NATO Command Structure and NATO Force Structure began to take place in order to adapt NATO for a more global role. With the 2010 NATO Strategic Concept, collective defence was moved to a higher priority than in the previous strategic concepts from 1991 and 1999. Furthermore, NATO's member states became increasingly aware of an imbalance of the distribution of military capabilities for NATO's deterrence and defence posture. This was, however, not reflected in analysis of this subchapter 4.4.

Regarding the capability perspective, NATO's European member states began to massively disarm on the 1990 CFE Treaty (see subchapter 4.2.2). This trend between the initial post-Cold War era and the end of the first decade of the post-Cold War era is meaningful in that there has been a significant reduction in deterrence potential.

In contrast to these disarmament efforts by NATO's member states, the empirical capability analysis provided an actual (minor) rise, wherein NATO-Europe became 'capable'.

While the first increase from 1992 to 2001 is still associated with the addition of further members in times of general disarmament, the minimal increase from 2001 to 2010 is possibly connected with the decommissioning of old equipment in Russia, the admission of numerous new albeit small members ("weight of the large number"), and the targeted restructuring of the armed forces in the light of foreign operations (e.g., significantly more armoured troop transporters).

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4.5 U.S. extended general nuclear deterrence for NATO in the post-Cold War era

Subchapter 4.5 is separated in four further subchapters. Subchapter 4.5.1 provides a very brief general introduction to the politico-military situation of the U.S. as the sole remaining superpower at the beginning of the post-Cold War era.

Based on the two-pronged approach in accordance with subchapter 4.1.2, the two main parts of subchapter 4.5 are subchapter 4.5.2 and 4.5.3. Subchapter 4.5.2 entails the empirical analysis of Russia's threat posture in terms of credibility. This subchapter is separated in four parts with an introduction at the beginning followed by three subchapter that are reach dedicated to the period under examination as explained in subchapter 4.1.2.1. Subchapter 4.5.3 provides a comprehensive overview on the military capability landscape for NATO in line with the quantitative methodology from subchapter 4.1.2.2. Lastly, subchapter 4.5.4 gives a brief wrap-up with the results of the empirical analysis of NATO as the 'collective' protégé in the integrated conventional/nuclear deterrence game.

4.5.1 An introduction to the early post-Cold War U.S. nuclear deterrence

Based on the experience based made by their first use of nuclear weapons against Japan in the Second World War and by comprehensive nuclear weapons tests in the early Cold War, the political decision-makers of the two major nuclear powers at the time considered nuclear weapons as predominantly strategic instruments of extreme measure. For them, these enabled the full destruction of the adversary's warfighting capacities, including all his military bases, stockpiles of nuclear and conventional weaponry, industrial production capacity and, lastly, population centres.[1099]

Considering that a potential massive mutual nuclear exchange between the two global superpowers U.S. and USSR would have destroyed at least the majority of the northern hemisphere, it seemed absurd to contemplate an actual nuclear warfighting strategy. Nevertheless, this was exactly, what has happened, especially after the Soviet Union began to reach nuclear parity by the late 1950s.

In that sense and for the decades to come in the nuclear age, nuclear warfare doctrines were developed by the military of any nuclear-armed state in order to establish a clear understanding

[1099] In contrast to strategic weapons, smaller nuclear weapons with limited yields were considered non-strategic, tactical *or* battlefield nuclear weapons. The difference between strategic and tactical nuclear weapons is not physically fixed but determined following their use in warfighting. See: US Congressional Research Service (2022): Nonstrategic Nuclear Weapons, p. 8, Hyperlink: https://sgp.fas.org/crs/nuke/RL32572.pdf (Last visit: 06.01.2022).

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in politico-military terms about the expected implications of different offensive and defensive nuclear options. Several issues regarding nuclear weapons usage had to be clarified, such as, *inter alia*, targeting strategies that differentiated between first strike (surprise) attacks and second strike (retaliation) capacities. For example, in a first strike attack, the adversary was assumed to especially attack the defender's nuclear capabilities in order to eliminate or reduce to the maximum amount possible a retaliatory response (counterforce targeting). Within the remit of a second-strike retaliation strategy, it was assumed that empty missile silos (because they were expected to be launched by the opponent due to a 'use-it-or-lose-it' evaluation) would not constitute as much of a useful target as other locations, such as communication and transport hubs, major industrial centres in densely populated urban areas or high-value areas for agriculture (countervalue targeting). Since Western researchers mainly considered scenarios with the U.S./NATO in the defender's role, a Western countervalue second strike in response to a Warsaw Pact/U.S.S.R. nuclear first strike received greater attention than a NATO nuclear first strike against the Warsaw Pact.[1100]

The U.S. role as NATO's central provider of nuclear deterrence has been confirmed by NATO at multiple occasions. The following paragraph can be found identically in all NATO Strategic Concepts of the post-Cold War era that were examined (1991, 1999, 2010):

> "The **supreme guarantee** of the security of the Allies is provided by the **strategic nuclear forces** of the Alliance, **particularly those of the United States**; the **independent strategic nuclear forces** of the **United Kingdom** and **France**, which have a **deterrent role of their own**, **contribute to the overall deterrence** and security of the Allies." (1991/1999/2010 NATO Strategic Concepts)[1101]

Considering that the nuclear contributions of the UK and France to NATO have already been addressed in subchapter 4.4.3.6, this subchapter is dedicated to the comprehensive nuclear deterrent of the U.S. in terms of credibility and capability, including the identification of its posture as either hard or soft.

[1100] Lutz, D. (1983): A Counterforce/Countervalue Scenario - Or How Much Destructive Capability Is Enough?, pp. 17-21.

[1101] Paragraph 54 in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022); paragraph 62 in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022); and paragraph 18 in: NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', pp. 14, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 03.12.2022).

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4.5.1 The credibility of U.S. extended nuclear deterrence in the post-Cold War era

This subchapter consists of four further subchapters. Subchapter 4.5.2.1 provides a general introduction to the analysis of the credibility of NATO's deterrence and defence posture in line with the qualitative methodology as presented in subchapter 4.1.2.1. The subchapters 4.5.2.2 to 4.5.2.4 are dedicated to three iterations of the key politico-military document of the U.S. (extended) nuclear deterrence, namely its Nuclear Deterrence Posture (NPR), in line with subchapter 4.1.2.1. The overall results are collected and presented in conjunction with the results from subchapter 4.5.3 in the interim conclusion on the U.S. extended strategic nuclear deterrence throughout the examined periods in subchapter 4.5.4.

4.5.1.1 Introduction

In terms of credibility, a state that threatened nuclear first strike or commented that popular centres could be 'fair game' in case of a nuclear second-strike retaliation walked a thin "red line". Because if such nuclear threat (*or* brinkmanship) was to be effective, the adversary had to believe them as credible. The clearer the formulation of such "red lines", the less flexibility a state had, when another state decided to cross that line. As a consequence, nuclear-armed states often design their nuclear policies with a certain level of 'strategic ambiguity' that leaves the national authorities in charge of releasing the nuclear weapons arsenal with sufficient freedom in their potential military reactions.[1102]

One instrument for transparently displaying the intentions of a nuclear-armed state regarding the conditions that lead to the use of nuclear weapons has been the publication of formal and officially signed documents, such as the military doctrines that were presented for Russia in subchapter 4.3.2.

An even greater variety of such documents exists for the U.S. since it has a democratic government which is sometimes obliged by the U.S. Congress to publicly provide detailed information on its foreign, security and defence policies. In the U.S. case, there are two specific challenges with a view to the vast array of available documents: (1) The risk of information overload, and (2) potential limited value due to repetition of standardised wording throughout different documents ('copy&paste') as well as overly generalised political statements without concrete factual information. In order to accommodate these two concerns, a careful selection had been made in order to remain focussed on the matter of the U.S. nuclear deterrent with its

[1102] War on the Rocks (2021): Believe It or Not: U.S. Nuclear Declaratory Policy and Calculated Ambiguity, Hyperlink: https://warontherocks.com/2021/08/believe-it-or-not-u-s-nuclear-declaratory-policy-and-calculated-ambiguity/ (Last visit: 05.01.2022).

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politico-military context. The following documents are the factual basis for of the upcoming three subchapters:

	Early post-Cold War era	*The post-Cold War era after the first decade*	*The post-Cold War era after the second decade*
Political context documents	1991 National Security Strategy	2002 National Security Strategy	2010 National Security Strategy
Military context documents	1993 Bottom-Up Review	2002 Quadrennial Defense Review	2010 Quadrennial Defense Review; 2010 Ballistic Missile Defence Review
nuclear deterrence documents	1994 Nuclear Posture Review	2002 Nuclear Posture Review	2010 Nuclear Posture Review

Table 88: Overview of relevant U.S. key politico-miliary documents for the defender's role [own compilation]

In accordance with Section 603 of the 1986 Goldwater-Nichols Act, the U.S. Congress required all U.S administrations to provide a comprehensive report on the U.S. foreign, security and defence policy in regard to national interests, instruments, commitments to other states and entities and so on. Initially, the National Security Strategy (NSS) was due annually. This changed in the time of the W. Bush administration that began to publish the report once in each legislature period, and the succeeding Obama administration had done so as well.[1103] The report is signed by the U.S. President and enables the respective U.S. administration to promote its unique vision for the foreign and security policy vision of the country. In this sense, the textual content of the report reflects the characteristics of the policies that the incumbent in the White House pursues in his day-to-day business in his position as the head of state and government.[1104] Since the 1993 Bottom-Up Review (BUR), the U.S. underwent an iterative review process on its armed forces. Since 1997, this process was legally based by the U.S. Congress on Section 923 of the National Defense Authorization Act for FY1997 by the U.S. Congress. These review documents evaluated the current state of the U.S. military posture at the time and projected potential challenges and tasks of the near future that required adjustment in terms of force structure, defence expenditures, military capabilities, etc.[1105] Given that one of the conventional technologies, namely ballistic missile defence (BMD), was evolving into a decisive element for the strategic nuclear deterrent of the U.S. in the examined timeframe, that particular military

[1103] Historical Office (n.a.): National Security Strategy – Overview, Hyperlink: https://history.defense.gov/Historical-Sources/National-Security-Strategy/ (Last visit: 05.01.2022).
[1104] CSIS (2017): Formulating National Security Strategy, p. 12, Hyperlink: https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/171006_CSIS_NationalSecurityStrategyFormulation_FINAL_0.pdf (Last visit: 18.01.2023).
[1105] Historical Office (n.a.): Quadrennial Defense Review – Overview, https://history.defense.gov/Historical-Sources/Quadrennial-Defense-Review/ (Last visit: 18.01.2023).

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capability receives further attention. Subsequently, relevant information is extracted from the military context documents. For the second decade of the post-Cold War era, the Department of Defence under the Obama administration published the first Ballistic Missile Defence report in the history of the U.S. high-level strategic documents. As a consequence, this document is examined in subchapter 4.5.2.4.

Lastly, the Nuclear Posture Review (NPR) was established under the Clinton administration as a key instrument by the Department of Defence for defining the U.S national nuclear policy, nuclear doctrines, military capability development and more for the U.S. nuclear deterrence. Beyond the regular stock-taking of the U.S. nuclear arsenal, the NPR provides guidance in regard to the nuclear deterrent for years to come. In the timeframe under scrutiny in this dissertation (1992-2016), there were a total of three NPR. The 1994 NPR of the Clinton administration and the 2002 NPR of the W. Bush administration were classified, but thankfully, indirect reports about the documents provide sufficient information for an analysis.[1106]

Based on the three to four documents per examination period whether the U.S. extended nuclear deterrence is analysed in accordance with the game-theoretic framework. As a result, each period concludes with a brief statement, if the U.S. nuclear deterrence posture has been hard or soft, reliable or unreliable for NATO within the remit of U.S. extended nuclear deterrence, and whether the U.S. was not willing to escalate or escalation ready.

Table 89 provides a quick reference to the indicators for U.S. extended deterrence for NATO which were tested for the three timeframes, i.e., the initial post-Cold War era, after the first decade of the post-Cold War era, and after the second decade of the post-Cold War era (see the duplicate in Table 22).

No.	*Indicators for a hard posture*	*Indicators for a soft posture*
1	Strengthen the military warfare role of nuclear weapons in the defender's nuclear defence policy	Retain/weaken the military warfare role of nuclear weapons in the defender's nuclear defence policy
2	Develop a post-*status quo* role for the defender's (extended) nuclear deterrent within the remit of its nuclear defence policy	Retain the *status quo* of the defender's (extended) nuclear deterrent within the remit of the of its nuclear defence policy
3	Enhance the defender's commitments to the military alliance through extended nuclear deterrence	Retain/limit the defender's commitments military alliance through extended nuclear deterrence
4	Develop a full-scale capability in the field of ballistic missile defence; with a focus on strategic ballistic missile defence	Develop a limited capability in the field of ballistic missile defence; with a focus on theatre-ballistic missile defence

Table 89: Defender's criteria for each posture in an integrated conventional/nuclear deterrence game

[1106] NTI (2022): The Nuclear Posture Review: What it is and why it matters, Hyperlink: https://www.nti.org/atomic-pulse/the-nuclear-posture-review-what-it-is-and-why-it-matters/ (Last visit: 18.01.2023).

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4.5.2.2 The U.S. initial post-Cold War extended nuclear deterrence for NATO

The transition phase that began with the dissolution of the Warsaw Pact and the subsequent demise of the Soviet Union in 1991 was the beginning of a new Euro-Atlantic regional order that gave the U.S. an opportunity for a historically unique 'unipolar moment' (Krauthammer).[1107] Widely considered as victor of the Cold War, the U.S. started the last decade of the 20th century with considerable vigour and no adversary that could match the politico-military standing of the Soviet Union. Subsequently, the U.S. was able to enjoy this role for several years until the country was thrusted into a new era in the wake of the 9/11 terrorist attacks on its own soil in 2001.[1108] The focus of this subchapter lies particularly on the early period of the U.S. unipolar moment that is set from 1991 when the Warsaw Pact fell apart and the Soviet Union lost its external threat posture, until approximately 1994 when the first Nuclear Posture Review was published.

In this transitionary period from the Cold War to the post-Cold War era, the U.S. remained adamant on their national security with special regard to its nuclear deterrence. The 1991 NSS declared plainly that

> "[e]ven in a new era, **deterring nuclear attack** remains the **number one defense priority of the United States**." (1991 NSS)[1109]

The document continues in accordance with this priority of its defence policy with paragraphs dedicated to the description and way ahead of the U.S. strategic and non-strategic nuclear forces. With respect to the strategic nuclear deterrent, the U.S. stated a clear commitment regarding the retention and modernisation of its nuclear triad.

> "The **modernization** of our **Triad of land-based missiles, strategic bombers and submarine-launched ballistic missiles** will be vital to the effectiveness of our deterrent in the next century." (1991 NSS)[1110]

While the details of the triad are addressed in-depth in subchapter 4.5.3 on U.S. extended nuclear deterrence capabilities, it is nevertheless a strong statement by the U.S. administration to give such specific attention to the modernisation of the triad despite the decreasing nuclear

[1107] Krauthammer, C. (1991): The Unipolar Moment, pp. 23-29.
[1108] Krauthammer, C. (2003): The Unipolar Moment Revisited, p.17.
[1109] Historical Office (1991): National Security Strategy of the United States, August 1991, p. 25. Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss1991.pdf?ver=3sIpLiQwmknO-RplyPeAHw%3d%3d (Last visit: 01.12.2022).
[1110] Historical Office (1991): National Security Strategy of the United States, August 1991, p. 25. Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss1991.pdf?ver=3sIpLiQwmknO-RplyPeAHw%3d%3d (Last visit: 01.12.2022).

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threat from the Soviet Union, which was still existing but declining by the time that the 1991 NSS was drafted and published; namely in August 1991.

Below the threshold of changing the national prioritisation of nuclear deterrence in terms of the capabilities, the practical posture of the U.S. nuclear deterrent was quite adaptable to the new geopolitical situation when procedural and operational questions were concerned:

> "[T]he scenario which we frequently projected as the precursor of their use [i.e. strategic nuclear weapons] – **massive war in Europe** – is **less likely than at any other time since World War II**. These developments affect questions of **nuclear targeting, the alert status and operational procedures** of our forces and **ultimately the type and number of weapons sufficient to ensure our safety and that of our allies**. We have already begun to make **adjustments to our nuclear forces** and to the **policies that guide them** in recognition of the disintegration of the Warsaw Pact and the changes in the Soviet Union itself" (1991 NSS)[1111]

Therefore, and by putting the different nuclear-related elements of the 1991 NSS as high-level strategic guidance for the U.S. defence posture in a nutshell, the U.S. chose to pursue a vigilant stance in regard to the issue of nuclear weapons, while remaining open for any adjustments of the strategic nuclear forces.[1112]

In addition, and without any concerns in view of the potential impact on U.S.-Russia relations, the U.S. further continued upon its course to develop a ballistic missile defence system in the spirit of the Reagan administration's Strategic Defence Initiative (SDI). While the level of ambition regarding the system's scope was undergoing a considerable downshift from the original SDI, the Global Protection Against Limited Strikes (GPALS) as it was called in the 1991 NSS has still intended through a layered approach that

> "[…] it will **protect our troops** in the field from **ballistic-missile** attack by the mid-1990s and that will **protect the United States itself from the turn of the century**. GPALS is designed to provide **protection against a ballistic missile launched from anywhere against** a target **anywhere** in the world" (1991 NSS)[1113]

[1111] Historical Office (1991): National Security Strategy of the United States, August 1991, p. 25. Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss1991.pdf?ver=3sIpLiQwmknO-RplyPeAHw%3d%3d (Last visit: 01.12.2022).

[1112] An example of that openness had been the signing of the START I Treaty in July 1991 by the U.S. and USSR in order to mutually reduce nuclear warheads and delivery systems. While this was seen as a positive outlook, the U.S. remained mindful of the still considerable Soviet nuclear arsenal of around 6.000 warheads at the time of the 1991 NSS. See: Historical Office (1991): National Security Strategy of the United States, August 1991, p. 1. Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss1991.pdf?ver=3sIpLiQwmknO-RplyPeAHw%3d%3d (Last visit: 01.12.2022).

[1113] Historical Office (1991): National Security Strategy of the United States, August 1991, p. 26. Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss1991.pdf?ver=3sIpLiQwmknO-RplyPeAHw%3d%3d (Last visit: 01.12.2022).

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In line to the information given in the 1991 NSS, the defence planning for a ballistic missile defence (BMD) system were mainly driven by the U.S. national level of ambition. But in view of the U.S. experiences from the 2nd Gulf War regarding the Patriot theatre-missile defence systems that successfully protected U.S. troops and allies from regional SCUD attacks, the 1991 NSS gave indications that allies could also principally benefit from the deployment of such a defensive system.[1114]

From today's perspective, it might not be surprising that the development of such a BMD system was just a sidenote back in the day. This changed over the course of the next two decades and the question of a working BMD that could intercept missiles coming in from anywhere around the globe became an important issue for the strategic nuclear balance (at least from Russia's perspective). This issue receives thorough attention in the 1993 Bottom-Up Review further below and in its follow-ups in the upcoming subchapter 4.5.2.3 and especially 4.5.2.4.

As the new post-Cold War era emerged and the US administration changed from H.W. Bush to Clinton in early 1993, one of the first defence-related actions of the Clinton administration was a thorough review of the U.S. defence planning and armaments programmes for the post-Cold War period. For the conventional military, the review was conducted under the title 'Report on the Bottom-Up Review' (BUR), which was eventually published in October 1993, and for the nuclear forces, this was the first Nuclear Posture Review (NPR).

In the scope of this subchapter on the U.S. nuclear deterrent, the 1993 BUR provided an overview on the U.S. efforts regarding Ballistic Missile Defence (BMD). Based on the overly ambitious and costly SDI programme of the Reagan era, a limited smaller-scale version of BMD, which was called GPALS at the time, was to be developed. Based on a first threat analysis, any cases of deliberate long-range missile strikes against the continental U.S., *inter alia* by Russia, were discarded as unlikely. However, the U.S. was seriously concerned about the threat from proliferated short-range and cruise missiles, potentially tipped with weapons of mass destruction (WMD). Given the shorter distances between launch and target, the system required was rather a so-called theatre missile defence system (TMD) than a fully developed strategic BMD against intercontinental missile strikes.

The distinction was decisive, because the last valid agreement of the 1972 ABM Treaty allowed the U.S. and USSR/Russia one ABM defence site with 100 land-based interceptor missiles per

[1114] Historical Office (1991): National Security Strategy of the United States, August 1991, p. 26. Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss1991.pdf?ver=3sIpLiQwmknO-RplyPeAHw%3d%3d (Last visit: 01.12.2022).

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country[1115]. Based on the existing TMD technology of the early 1990s, the report provided several options for different combinations of TMD and separate options for a potential strategic BMD system with different 'price tags' for the government as well as first deployment timelines. Subsequently, the 1993 BUR proposed to enhance the existing land- and sea-based TMD and to launch a technology development programme in order to prepare the technical groundwork once a political decision was made to initiate a concrete military capability development/production project on strategic BMD (time projections for first deployment of such system assumed early to mid-2000s).[1116]

Beyond the particular aspect of BMD, the 1993 BUR presented a comprehensive major overhaul for the U.S. military planning regarding the necessary financial resources, the military personnel numbers, as well as the general size of the force formations of the U.S. Armed Forces.[1117] The new conceptual thinking, which Aspin's report proposed in regard to the definition of U.S. military requirements, *inter alia*, needed for the conduct two major regional operations at the same time, met strong critique from a military perspective. The U.S. military representatives thought that neither defence investment nor the capabilities were sufficient to accomplish the politically defined level of ambition in regard to warfighting in major regional operations at once. Nevertheless, the 1993 BUR was the foundation for the development of the U.S. Forces in terms of credibility (i.e., what the military aimed to do) and capability (i.e., how the military aimed to do it) for the years to come. Subsequently, the 1993 BUR completed its legacy by providing orientation for the follow-up Quadrennial Defense Reviews (QDR), which began in 1997.[1118]

Moving from the general military context with a particular emphasis on BMD, which has not yet become a part of the U.S. nuclear deterrent, the Clinton administration undertook an additional analysis beyond the 1993 BUR in order to identify the role of the U.S. nuclear arsenal in the post-Cold War era.

[1115] For completion, it should be noted that the ABM Treaty did not differentiate between TMD and strategic BMD. The U.S. and Russia agreed to amend the ABM Treaty in 1997 ('Demarcation Agreement') in order to define the conditions, under which TMD are allowed to be developed, deployed, and operated. While the amendment was ratified by the Russian Duma, the Clinton administration never asked the U.S. Congress for ratification to due domestic differences. See: Rhinelander, J. (2001): The ABM Treaty – The Past, Present and Future (Part I), p. 106.

[1116] Historical Office (1993): Report on the Bottom-Up Review, pp. 43-48, Hyperlink: https://history.defense.gov/Portals/70/Documents/dod_reforms/Bottom-upReview.pdf (Last visit: 03.12.2022).

[1117] Historical Office (1993): Report on the Bottom-Up Review, pp. 13-31, Hyperlink: https://history.defense.gov/Portals/70/Documents/dod_reforms/Bottom-upReview.pdf (Last visit: 03.12.2022).

[1118] Air & Space Forces Magazine (2003): The Legacy of the Bottom-Up Review, Hyperlink: https://www.airandspaceforces.com/ar1ticle/1003bur/ (Last visit: 03.12.2022).

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The analysis in form of the 1994 Nuclear Posture Review (NPR) was the first examination of the national nuclear deterrent in 15 years and the first of its kind since the end of the Cold War in order to adapt the U.S. nuclear deterrent in view of the changed geopolitical situation following the dissolution of the Soviet Union. The 1994 NPR pursued a comprehensive approach by covering a wide range of military aspects, such as policy, doctrine, force structure and further elements pertaining to the security and safety of the U.S. nuclear deterrent. In addition, the 1994 NPR was intended to accompany the 1993 BUR in order to achieve a comprehensive defence and military policy revision for the post-Cold War era that mainly focussed on the downshifting of the U.S. armed forces, which should include considerable reductions in defence expenditures.[1119]

Regarding the generation process of the 1994 NPR, the Department of Defence had set-up a high-level steering group for the departmental coordination process. Soon after the group started its work, the military became increasingly doubtful about the intentions of one of its members, namely the Assistant Secretary of Defense for Nuclear Security and Counterproliferation, regarding the extensiveness of the nuclear downshifting.[1120] It is not surprising that the scope of the downshift (especially in terms of defence expenditure shares) challenged the profiteers of a strong nuclear deterrent, *inter alia*, the U.S. Strategic Command as dedicated centralised command and control entity for the U.S. nuclear arsenal, which was just founded in October 1992[1121], the U.S Air Force with their heavy bomber fleet and the U.S. Navy with their strategic nuclear submarines.

Considering that the 1994 NPR was largely classified[1122], two sources shed some highlight the outcomes of the NPR of which one reflects the U.S. military perspective and the other the more formal U.S. Department of Defence point of view:

The first document was drafted by the strategic advisory group[1123], which was charged by the Commander-in-Chief of the U.S. Strategic Command. The group formulated a short nuclear review paper that addressed key issues of the U.S. nuclear deterrent in the new era from a

[1119] US Department of Defense (1995): Annual Report to the President and the Congress, February 1995, p. 83, Hyperlink: https://history.defense.gov/Portals/70/Documents/annual_reports/1995_DoD_AR.pdf?ver=2014-06-24-152712-813 (Last visit: 18.01.2023).

[1120] The Nuclear Information Project (2005): The 1994 Nuclear Posture Review, Hyperlink: http://www.nukestrat.com/us/reviews/npr1994.htm (Last visit: 18.01.2023).

[1121] US Strategic Command (2018): History, Hyperlink: https://www.stratcom.mil/About/History/ (Last visit: 18.01.2023).

[1122] NTI (2022): The Nuclear Posture Review: What it is and why it matters, Hyperlink: https://www.nti.org/atomic-pulse/the-nuclear-posture-review-what-it-is-and-why-it-matters/ (Last visit: 18.01.2023).

[1123] The Nuclear Information Project (n.a.): Strategic Advisory Group, Hyperlink: http://www.nukestrat.com/us/stratcom/sag.htm (Last visit: 18.01.2023).

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military perspective.[1124] This informal 1994 NPR wrap-up report on the U.S. Nuclear Forces Post-1994 has been made declassified by the US Government under the Freedom of Information Act and is thus publicly available. Given that the status of the document is the conclusion of a working body subordinate to the highest-ranking military officer of the U.S. Strategic Command, it applies more direct language on both potential threats as well as the 'urgent necessity' to retain the nuclear deterrent at a level commensurate to remain prepared for any nuclear contingency.

In regard to Russia, the paper bluntly states that

> "[s]o long as the **nuclear strike forces** of the **former Soviet empire** remain **largely intact**, U**.S. strategy** must **guard against their being put to use** by a government **hostile to the United States and its allies**" (Nuclear Forces; Post 1994/SAG Paper)[1125]

In this spirit, the strategic advisory group recommended the U.S. administration to pursue a hedging strategy that prepared the U.S. nuclear deterrent for all contingencies in case of an increasing nuclear threat, particularly with a view to Russia. The practical duties of the U.S. armed forces in order to execute this strategy should be the retention of an

> "(1) approximate **strategic capability relative to the extant nuclear forces** in the **former Soviet Union** and 2) **sufficient readiness** on the part of U.S. nuclear forces to **respond to the rapid pace** at which adverse political change could take place" (Nuclear Forces; Post 1994/SAG Paper)[1126]

The SAG paper further continued upon the course of making a case for a robust and comprehensive U.S. nuclear deterrent as an 'instrument of national power' (SAG Paper conclusion), which also, inter alia, was intended as a commitment in the scope of extended deterrence to the U.S. allies and partner countries. In addition, the group that presented this paper also warned that the disappearance of the central adversary of the U.S., against which the U.S. nuclear arsenal was built, should not lead to unstructured reductions, because (1) Russia still has a considerable nuclear force, and (2) a credible deterrence rests on the balance between the different delivery systems of the U.S. nuclear triad that are required for an effective operational force. Lastly, the SAG report warned that unnecessarily large unilateral reductions in the U.S. nuclear deterrent could signal other potential rival powers that the U.S. would appear

[1124] The Nuclear Information Project (1994): Nuclear Forces; Post 1994, Hyperlink: http://www.nukestrat.com/us/stratcom/sagpost94.htm (Last visit: 18.01.2023).
[1125] The Nuclear Information Project (1994): Nuclear Forces; Post 1994, SAG Paper, p. 1, Hyperlink: http://www.nukestrat.com/us/stratcom/96-84h_STRATCOM071294.pdf (Last visit: 20.01.2023).
[1126] The Nuclear Information Project (1994): Nuclear Forces; Post 1994, SAG Paper, p. 1, Hyperlink: http://www.nukestrat.com/us/stratcom/96-84h_STRATCOM071294.pdf (Last visit: 20.01.2023).

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to be practically 'self-deterred' (SAG Paper conclusion) from using these weapons in case of most extreme aggressions by others in relation to the use of WMD.[1127]

The other (potentially more reliable) source that concluded the 1994 NPR was the publicly available 1995 Annual Report to the President and the Congress from the U.S. Department of Defense. The report contained three essential aspects of the U.S. nuclear deterrent, namely (1) the security context including a threat evaluation and the impact of cooperative security mechanisms (the 1991 START I Treaty in particular), (2) the status and aim of the strategic nuclear deterrent, and (3) the role of non-strategic nuclear weapons for U.S. extended deterrence.[1128] With a view to the U.S. credibility regarding its nuclear deterrent, two statements strenuously underline the U.S. position in this vital question. The first statement is of a more general nature:

> "[…] **nuclear weapons** remain an **essential part of American military power**. Concepts of **deterrence and survivability** must adapt to the new **international environment**, yet continue to **be central to the U.S. nuclear posture**. Thus, the United States will **continue to threaten retaliation**, including **nuclear retaliation**, and to **deter aggression against the United States**, U.S. forces, and **U.S. allies**." (1995 Annual Report to the President and the Congress) [1129]

The second statement, which was selected from the 1995 Annual Report, has a direct link to the extended deterrence that the U.S. provides for its allies, such as the member states of NATO:

> "Through **forward basing** and **power projection capabilities**, **overseas U.S. military presence – including nuclear capabilities** – promote regional stability, avert crisis, and deter war. […] **maintaining U.S. nuclear commitments with NATO**, and **retaining the ability to deploy nuclear capabilities** to meet various regional contingencies, […]. Thus, the **United States continues to extend deterrence to U.S. allies** and friends." (1995 Annual Report to the President and the Congress)[1130]

Both statements reflect a robust retention of the U.S. strategic and non-strategic nuclear arsenal for any potential contingencies in the post-Cold War era, including the coverage of allies through extended nuclear deterrence.

[1127] The Nuclear Information Project (1994): Nuclear Forces; Post 1994, SAG Paper, pp. 2 f. and pp. 5 f., Hyperlink: http://www.nukestrat.com/us/stratcom/96-84h_STRATCOM071294.pdf (Last visit: 20.01.2023).
[1128] Historical Office (1995): FY 1995: Annual Report to the President and the Congress, pp. 83-92, Hyperlink: https://history.defense.gov/Portals/70/Documents/annual_reports/1995_DoD_AR.pdf?ver=2014-06-24-152712-813 (Last visit: 20.01.2023).
[1129] Historical Office (1995): FY 1995: Annual Report to the President and the Congress, p. 84, Hyperlink: https://history.defense.gov/Portals/70/Documents/annual_reports/1995_DoD_AR.pdf?ver=2014-06-24-152712-813 (Last visit: 20.01.2023).
[1130] Historical Office (1995): FY 1995: Annual Report to the President and the Congress, p. 84, Hyperlink: https://history.defense.gov/Portals/70/Documents/annual_reports/1995_DoD_AR.pdf?ver=2014-06-24-152712-813 (Last visit: 20.01.2023).

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Following the thorough examination of the essential documents as indicated in subchapter 4.5.1, a conclusion can now be drawn based on the operationalised game-theoretic framework of this dissertation: In the initial post-Cold War era, the U.S. has pursued a hard posture for its nuclear deterrence because national decision-making of the U.S. administrations of H.W. Bush and Clinton determined that it is useful to have an adequately sized nuclear triad to hedge against any nuclear threat, which could arise in the near- or mid-term future. Furthermore, given that force reductions in the strategic nuclear deterrent were largely pursued on a mutual basis with Russia, the U.S. wanted to avoid any loss of credibility due to imbalanced downshifts in comparison to the country with one of the two largest nuclear arsenals. Lastly, the U.S. remained committed to its allies in the scope of U.S. extended nuclear deterrence through the continuation of the forward deployment of non-strategic nuclear weapons, which were however drastically reduced in size and scope.

Following the application of the four operational indicators in Table 89 of subchapter 4.5.2.1 on the 1994 Nuclear Posture Review in the military context of the 1993 Bottom-Up Review and the political overall framework of the 1991 National Security Strategy, the U.S. employed a 'soft' nuclear deterrence posture in the initial-Cold War era.

The individual results from the evaluation of the four indicators were the following:

(1) *Retain/weaken the military warfare role of nuclear weapons in the defender's nuclear defence policy (soft)*:

In view of the dissolution of the Soviet Union as the last remnant of the Cold War, the risk of a large-scale strategic nuclear war has practically diminished, *albeit* the Soviet arsenal, now in control of Russia, remained a concern for the U.S. As a consequence, the U.S. engaged the new Russian leadership in order to ensure the implementation of the 1991 START I Treaty and the subsequent negotiations for a follow-on treaty (see subchapter 4.2.3). In regard to its own nuclear arsenal, the U.S. administration decided to retain the nuclear triad at a lower quantity (i.e., missile and warhead count) as well as quality (e.g., readiness level of military personnel, nuclear targeting).

(2) *Retain the status quo of the defender's (extended) nuclear deterrent within the remit of the of its nuclear defence policy (soft)*:

The U.S. pursued a mutually acceptable *status quo* with the Soviet prime successor states Russia on the basis of equally mutually agreed reductions in nuclear warheads and delivery systems derived from the 1991 START I Treaty. In continuity of its Cold War position, the U.S. reiterated that it was not willing to deny itself the option of a nuclear first strike, especially if another state would attempt an attack with WMD on the continental U.S., its

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forces abroad, or its allies. In view of this strategic ambiguity, the U.S. should nevertheless be principally considered escalation-capable, even though it would perform such action potentially rather at a later node of a deterrence game than as an early option.

(3) *Retain/limit the defender's commitments military alliance through extended nuclear deterrence (soft)*:

Within the remit of the U.S. extended nuclear deterrence for NATO, the U.S. continued to provide a nuclear 'umbrella' for its European allies at the strategic level. At the tactical level, however, the U.S. administration began to withdraw non-strategic nuclear weapons from Europe on a massive scale. Furthermore, the U.S./NATO theatre-based nuclear deterrence and defence planning was terminated at the end of the Cold War. Nevertheless, in order to underline the ongoing U.S. commitment a very limited number of non-strategic nuclear weapons remained in Europe as part of the nuclear sharing arrangements with a few selected NATO member states.

(4) *Develop a limited capability in the field of ballistic missile defence; with a focus on theatre-ballistic missile defence (soft)*:

Following the end of the Cold War, the *rationale* for a full-scale strategic ballistic missile defence system, such as the Reagan administration's SDI project, lost considerable traction. In response to the experiences made from the U.S. theatre-missile defence (TMD) systems used in the Middle East in the context of the second Gulf War, the U.S. anti-ballistic missile defence research and development efforts were focussed in the TMD domain with an option of introducing a larger BMD system in the early 2000s.

4.5.2.3 The U.S. extended nuclear deterrence for NATO after the first decade of the post-Cold War era

The next period under examination begins a decade after the dissolution of the Soviet Union. Since the year 2000, a new Republican administration had overtaken the White House from the previous Democratic administration in the U.S. The new government under George W. Bush complied its congressional liability to present a new National Security Strategy with a two-year delay. The document was eventually published in September 2002 and was written based on the impressions from the 9/11 terrorist attacks on the continental U.S. in 2001 as well as the President's personal perspective regarding certain so-called *rogue states* that allegedly or factually pursuing WMD and long-range missile capabilities, which offered a threat for the U.S.

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territory, its forces and U.S. allies.[1131] In contrast to the pressing challenges arising from previously non-nuclear states that aspired access to nuclear weapons, the established nuclear powers have received relatively modest attention:

> "We are attentive to the **possible renewal** of old patterns of **great power competition**. Several potential **great powers** are now in the midst of **internal transition**—most importantly **Russia**, India, and China." (2002 NSS)[1132]

Given that Russia was selected as the third state challenger in this dissertation's game-theoretic framework, the U.S. position towards that country is of particular importance. In reaction to the 9/11 terrorist attacks on the U.S., Russia under then-President Putin was quick to respond to the new geopolitical realities emerging in the wake of this incident and contacted the U.S. President with an offer of support for the U.S. evolving 'global war on terrorism'. The Kremlin's perspective was in no small part utilitarian, because the Kremlin aspired the return of Russia as a great power by (re-)establishing a Russian sphere of influence following the politically and economically gloomy Yeltsin years. From a strategic communication perspective, Russia had an easy time connecting its own national experiences from the 1999 Chechen terrorist acts in Moscow with those that the U.S. just made with *Al Quaida* in September 2001.[1133] In view of the 2002 NSS statements on Russia, the Kremlin's campaign of a 'fraternisation' – particularly between the Presidents of both countries – following 9/11 paid off at the highest level:

> "[T]he **United States and Russia are no longer strategic adversaries**. The **Moscow Treaty on Strategic Reductions is emblematic of this new reality** and reflects a critical change in Russian thinking that promises to lead to **productive, long-term relations with the Euro-Atlantic community** and the United States." (2002 NSS)[1134]

The 2002 NSS went even further by underlining the steps, which were taken in U.S.-Russia relations, and that opportunities for further cooperation, *inter alia* in the field of ballistic missile defence, have begun to evolve:

[1131] Historical Office (2002): The National Security Strategy of the United States of America, September 2002, pp. 5-7 and pp. 13-16, Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss2002.pdf?ver=oyVN99aEnrAWijAc_O5eiQ%3d%3d (Last visit: 18.01.2023).

[1132] Historical Office (2002): The National Security Strategy of the United States of America, September 2002, p. 26, Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss2002.pdf?ver=oyVN99aEnrAWijAc_O5eiQ%3d%3d (Last visit: 18.01.2023).

[1133] O'Loughlin, J./O Tuathail, G./Kolossov, V. (2004): A 'Risky Westward Turn'? Putin's 9-11 Script and Ordinary Russians, pp. 3-5 and pp. 13-15.

[1134] Historical Office (2002): The National Security Strategy of the United States of America, September 2002, p. 26, Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss2002.pdf?ver=oyVN99aEnrAWijAc_O5eiQ%3d%3d (Last visit: 18.01.2023).

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> "Having moved **from confrontation to cooperation** as the hallmark of our **relationship with Russia**, the dividends are evident: an **end to the balance of terror** that divided us; an **historic reduction in the nuclear arsenals on both sides**; and **cooperation** in areas such as counterterrorism and **missile defense that until recently were inconceivable**." (2002 NSS)[1135]

In comparison to the 1991 NSS, which was presented in the previous subchapter, the 2002 NSS reflected the challenge of a credible nuclear deterrent in order to deter another nuclear power as an issue of the past Cold War instead of a topic for the 21st century. Since the 1990s, the 2002 NSS identified a number of rising rogue states which were deemed immune to any deterrence efforts.[1136]

As a reaction to this exogenous threat, the U.S. administration under H.W. Bush was determined on preparing the U.S. armed forces for a state-to-state conflict with countries that were willing to question the *status quo* at the regional level to the detriment of U.S. national interests, including by posing a military threat against regionally deployed U.S. forces. These operational goals for the military were subsequently formulated in the 2002 Quadrennial Defense Review (QDR):

> "*Deterring Threats and Coercion Against U.S. Interests*. A multifaceted approach to deterrence is needed. Such an approach **requires forces and capabilities** that provide the President with a **wider range of military options** to **discourage aggression or any form of coercion**. […] This new approach to deterrence also requires **non-nuclear forces** that can **strike with precision at fixed and mobile targets** throughout the depth of an **adversary's territory**; **active and passive defenses**; and rapidly deployable and sustainable forces that can decisively defeat any adversary. A final aspect of deterrence, addressed not in the QDR but in the **Nuclear Posture Review**, is related to the **offensive nuclear response capability** of the United States." (2001 QDR)[1137]

The specific defence policy goal of deterring threats is examined in more detail in the 2001 QDR, which offers valuable indicators for a shift in the balance between the U.S. military capabilities pertaining to conventional deterrence in comparison to those of the nuclear deterrence.

[1135] Historical Office (2002): The National Security Strategy of the United States of America, September 2002, p. 13, Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss2002.pdf?ver=oyVN99aEnrAWijAc_O5eiQ%3d%3d (Last visit: 18.01.2023).

[1136] Historical Office (2002): The National Security Strategy of the United States of America, September 2002, pp. 13-16, Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/nss2002.pdf?ver=oyVN99aEnrAWijAc_O5eiQ%3d%3d (Last visit: 18.01.2023).

[1137] Historical Office (2001): Quadrennial Defense Review Report, September 2001, p. 12, Hyperlink: https://history.defense.gov/Portals/70/Documents/quadrennial/QDR2001.pdf?ver=AFts7axkH2zWUHncRd8yUg%3d%3d (Last visit: 20.01.2023).

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> "**Deterrence in the future** will continue to depend heavily upon the **capability resident in forward stationed and forward deployed combat and expeditionary forces**, […]. U.S. forces must possess a wide range of **offensive and defensive capabilities** that can **achieve strategic and operational objective**s in the face of determined adversaries […]. DoD will **pursue new deterrence tools** that not only hold at risk an adversary's military forces and other valued assets, but also **extend greater protection to allies** and friends in crisis through capabilities such as **missile defenses** […]." (2001 QDR)[1138]

Before exploring the implications of the U.S. plans regarding its arms forces from a nuclear deterrence point of view, the 2001 QDR also examined the roles of NATO and Russia for the new era following the 9/11 attacks. NATO's member states proved that collective defence did not represent a one-way street, where the European allies enjoyed the extended deterrence provided by the U.S. while not committing themselves.

> "[…] as witnessed in the wake of the terrorist attacks on the United States, **NATO's invocation of Article V demonstrates the commitment of America's partners to collective defense**, which bolsters the security of the United States." (2001 QDR)[1139]

In contrast, the role of Russia as identified by the 2001 QDR was not as positive as it would become in the 2002 NSS. Nevertheless, the statements of the review were decisive, considering the implications from a Russian threat to NATO and the U.S.:

> "An opportunity for cooperation exists with Russia. **It does not pose a large-scale conventional military threat to NATO**. Yet, at the same time, **Russia pursues a number of policy objectives contrary to U.S. interests**." (2001 QDR)[1140]

Summing up the political and general military context after the first decade of the post-Cold War era, the H.W. Bush administration saw the main challenges for the U.S. in emerging regional powers that pursued WMD and intended to rival the U.S. in regional *status quo* challenges rather than the re-emergence of a major great power that challenges the U.S. at a global scale. While not totally ignorant of the fact that the great powers still pursued interests contrary to those of the U.S., such an issue was not leading to an immediate politico-military response by the U.S. in its specific deterrence posture.[1141]

[1138] Historical Office (2001): Quadrennial Defense Review Report, September 2001, p. 25, Hyperlink: https://history.defense.gov/Portals/70/Documents/quadrennial/QDR2001.pdf?ver=AFts7axkH2zWUHncRd8yUg%3d%3d (Last visit: 20.01.2023).
[1139] Historical Office (2001): Quadrennial Defense Review Report, September 2001, pp. 14 f., Hyperlink: https://history.defense.gov/Portals/70/Documents/quadrennial/QDR2001.pdf?ver=AFts7axkH2zWUHncRd8yUg%3d%3d (Last visit: 20.01.2023).
[1140] Historical Office (2001): Quadrennial Defense Review Report, September 2001, pp. 4 f., Hyperlink: https://history.defense.gov/Portals/70/Documents/quadrennial/QDR2001.pdf?ver=AFts7axkH2zWUHncRd8yUg%3d%3d (Last visit: 20.01.2023).
[1141] NTI (2002): Nuclear Posture Review, Hyperlink: https://www.nti.org/analysis/articles/nuclear-posture-review/ (Last visit: 20.01.2023).

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In view of such irregular and regional threats to the U.S., the country's government opted for a fundamental change in its nuclear triad since its inception in the Cold War. While the 2001 QDR had already sketched the changes by differentiating deterrence through a nuclear and non-nuclear component, including the deployment of ballistic missile defences, the 2002 NPR presented a fully developed conceptual outline. Considering that this key document is classified, the U.S. government has fortunately provided a transcript of a Congressional hearing that provides a sufficient number of quotes from the 2002 NPR. This enables the creation of a situational picture of the U.S. plans for its nuclear deterrent.

The 2002 NPR announced nothing less than a comprehensive revision to be undertaken in order to redirect the U.S. efforts pertaining to nuclear and strategic conventional deterrence by introducing a so-called 'New Triad':

> "This report establishes a New Triad, composed of:
> - **Offensive strike systems** (**both nuclear and non-nuclear**);
> - **Defenses** (both **active** and passive); and
> - A revitalised defense infrastructure that will provide new capabilities in a timely fashion to meet emerging threats" (2002 NPR excerpt/Foreword by Secretary of Defense Rumsfeld)[1142]

On the positive side for the U.S. nuclear deterrent, the NPR underlined the importance of its nuclear arsenal for the protection of itself and its allies even in cases where competing powers conduct threats below the level of WMD:

> "**Nuclear weapons** play a **critical role** in the defense capabilities of the United States, its allies and friends. They provide **credible military options to deter** a wide range of **threats, including WMD and large-scale conventional military force**. […]" (2002 NPR excerpt)[1143]

However, in absence of a monolithic military adversary, the Department of Defense identified the need to adjust its deterrent in order to respond more adequately towards the various challenges that the country might encounter in the new millennium:

> "However, "U.S. **nuclear forces, alone** are **unsuited** to most of the contingencies for which the United States prepares. […] A "**new mix" of nuclear, non-nuclear and defensive capabilities "is required** for the diverse set of potential adversaries and unexpected threats that United States may confront **in the coming decades**." (2002 NPR excerpt)[1144]

[1142] FAS (2002): Nuclear Posture Review [Exercepts], p.1, Hyperlink: https://uploads.fas.org/media/Excerpts-of-Classified-Nuclear-Posture-Review.pdf (Last visit: 06.01.2023).
[1143] FAS (2002): Nuclear Posture Review [Exercepts], p. 2, Hyperlink: https://uploads.fas.org/media/Excerpts-of-Classified-Nuclear-Posture-Review.pdf (Last visit: 06.01.2023).
[1144] FAS (2002): Nuclear Posture Review [Exercepts], p. 2, Hyperlink: https://uploads.fas.org/media/Excerpts-of-Classified-Nuclear-Posture-Review.pdf (Last visit: 06.01.2023).

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In accordance with McDonough, the ambitions U.S. plans regarding the development of the 'New Triad' were conducted in continuity of U.S. politico-military goals of the Cold War that entailed the prospect of gaining an advantage over any nuclear-armed adversary through escalation dominance, regardless if the challenger would be a great power or a rogue state.

It should be stressed that the individual parts of the New Triad, while powerful in their own right, do not individually constitute a sufficiently effective deterrence. But a combination of even a limited strategic ballistic missile defence with a variety of offensive system provide the U.S. President with military options could principally tip the established strategic balance between the U.S. and Russia, as the post-Cold War era further progresses.[1145]

> "**Composed of both non-nuclear systems and nuclear weapons**, the strike element of the New Triad can provide **greater flexibility in the design and conduct of military campaigns** to defeat opponents decisively. **Non-nuclear strike capabilities may be particularly useful** to **limit collateral damage and conflict escalation**. **Nuclear weapons** could be **employed against targets able to withstand non-nuclear attack**, (for example, deep underground bunders or bio-weapon facilities)." (2002 NPR excerpt)[1146]

Thus, and in line with the 2002 NPR, the New Triad was not merely a political instrument for the W. Bush administration to ensure strategic nuclear stability between the nuclear-armed states, but also a potential instrument for actual U.S. warfighting. The wording in the excerpt's quote above shows that the impact of the different types of offensive weapons (non-nuclear and nuclear) were contemplated in terms of their practical usability in future U.S. military operations abroad.

In contrast to the strategic dimension, which represents the main focus of the U.S. extended nuclear deterrent, there has also been the continuous question of the U.S. non-strategic extended nuclear deterrent with a view to NATO in general and the allied states that participated in the nuclear sharing arrangement with the U.S. In this specific part of the nuclear domain, the 2002 NPR promoted principally the continuity of the *status quo* which might only be revised in scope and depth following mutually agreement in the transatlantic alliance:

> "DoD will **not seek any change to the current posture** in FY02 but **will review** […] whether any modifications to the **current posture** are **appropriate to adapt to the changing threat environment**. […] **Dual capable aircraft** and **deployed weapons** are important to the **continued viability of NATO's nuclear deterrent strategy** and **any changes need to be discussed within the alliance**." (2002 NPR excerpt)[1147]

[1145] McDonough, D. (2004): The "New Triad" of the Bush Administration: Counterproliferation and Escalation Dominance in US Nuclear Strategy, pp. 627-629.
[1146] FAS (2002): Nuclear Posture Review [Exercepts], p. 3, Hyperlink: https://uploads.fas.org/media/Excerpts-of-Classified-Nuclear-Posture-Review.pdf (Last visit: 06.01.2023).
[1147] FAS (2002): Nuclear Posture Review [Exercepts], p. 10, Hyperlink: https://uploads.fas.org/media/Excerpts-of-Classified-Nuclear-Posture-Review.pdf (Last visit: 06.01.2023).

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The last critical element under scrutiny for determining the U.S. posture in the early W. Bush years represents the question of ballistic missile defence (BMD).

As shown in the initial comment of then-Secretary of Defense Rumsfeld in the congressional hearing on the 2002 NPR, BMD was intended to be an integral part *or* second leg of the New Triad. As shown in subchapter 4.5.2.1, the basic technology of an anti-ballistic missile system based on interceptor missiles in conjunction with a radar to detect incoming ballistic (conventional or nuclear) missiles has progressed considerably in the years of the Clinton administration. At the turn of the millennium, the new U.S. government began to concretely examine BMD for first deployment for the defence of its own territory and force, as well as those of its allies:

> "**Missile defenses** could defeat **small-scale missile attacks intended to coerce the United States into abandoning an embattled ally or friend**. **Defenses** that provided **protection for strike capabilities** of the New Triad and for other power protection forces would **improve the ability of the United States and its allies** and friends to **counterattack an enemy**. They may also provide the President with an **option to manage a crisis involving one or more missile and WMD-armed opponents**." (2002 NPR excerpt)[1148]

In order to moving ahead in the deployment of such a BMD system, the U.S. administration had to eliminate one central stumbling block: The 1972 ABM Treaty, which it had signed with the Soviet Union in the Cold War to halt the arms race for defensive missile systems that intended to disrupt the strategic nuclear balance between the two superpowers. This treaty had remained in effect even after the USSR dissolved and Russia had taken over the Soviet nuclear legacy.[1149]As a consequence of the U.S. governmental threat perception regarding the risk of future limited long-range missile strikes from Iran or North Korea, the W. Bush administration was determined to leave the treaty and announced so in late 2001. Six months later, in June 2002, the U.S. withdrawal from the 1972 ABM Treaty went into effect and the route for BMD deployment was opened. At first, Russia's response did not entail the initiation of an arms race *per se*, but as time progressed after the first decade of the post-Cold War era, advancements in Russia's missile technology (e.g., hypersonic propulsion) were increasingly developed with a

[1148] FAS (2002): Nuclear Posture Review [Exercepts], p. 3, Hyperlink: https://uploads.fas.org/media/Excerpts-of-Classified-Nuclear-Posture-Review.pdf (Last visit: 06.01.2023).

[1149] For completeness, it should be noted that the following three former Soviet member states also became participants in the ABM Treaty after the Soviet Union dissolved: Belarus, Kazakhstan, and Ukraine.
See: NTI (2002): ABM Treaty, Hyperlink: https://www.nti.org/education-center/treaties-and-regimes/treaty-limitation-anti-ballistic-missile-systems-abm-treaty/ (Last visit: 20.01.2023).

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few to overcoming BMD systems in order to retain the strategic nuclear balance between the two countries.[1150]

Following the application of the four operational indicators in Table 89 of subchapter 4.5.2.1 on the 2002 Nuclear Posture Review in the military context of the 2002 Quadrennial Defense Review and the political overall framework of the 2002 National Security Strategy, the U.S. employed a 'hard' nuclear deterrence posture in the initial-Cold War era.

The individual results from the evaluation of the four indicators were the following:

(1) *Strengthen the military warfare role of nuclear weapons in the defender's nuclear defence policy (hard)*: The congressional hearing of Secretary of Defense Rumsfeld who presented the 2002 NPR to the U.S. Congress provided valuable insight in a revised politico-military strategic thinking of the U.S. government at the time. With the introduction of a New Triad in contrast to the existing nuclear triad, the U.S. administration under W. Bush clearly attributed an operational *or* warfighting perspective on the existing nuclear triad that included offensive nuclear- and non-nuclear missiles as well as passive and active ballistic missile defence systems in order to deter and, in case of conflict, defeat an adversary.

(2) *Develop a post-status quo role for the defender's (extended) nuclear deterrent within the remit of its nuclear defence policy (hard)*:

Together with the introduction of the New Triad, the 2002 NPR proposed a modernisation of the different legs of the traditional nuclear triad through its transformation into New Triad that consists, *inter alia*, of offensive (i.e., the traditional nuclear triad plus conventionally armed strategic missiles) as well as defensive (i.e., passive and active systems, such as BMD) weapons. Furthermore, U.S efforts in regard to bilateral agreements with Russia on mutual disarmament largely stalled, except for a five-page treaty (2002 SORT) that provide a follow-on limit to nuclear warheads but without references to delivery systems (see subchapter 4.2.3). Especially the disregard of delivery systems accommodated the U.S. position to transform some of its missiles and heavy bombers into conventionally armed weapon systems.

(3) *Retain/limit the defender's commitments military alliance through extended nuclear deterrence (soft)*:

The U.S. administration under W. Bush continued upon the course of its processor to commit its extended strategic nuclear deterrent for NATO while further severely reducing

[1150] Ifft, E. (2019): The Demise of the ABM Treaty, pp. 21-24.

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non-strategic nuclear weapons forward deployed to Europe between 2001-2006 by 85 percent.[1151] Nevertheless, a minimal forward deployment posture of non-strategic nuclear weapons in conjunction with the U.S. nuclear sharing arrangement with a few selected NATO member states remained. Changes to this U.S. extended nuclear deterrent were not undertaken in the 2002 NPR and would require prior discussions in NATO's relevant committees.

(4) *Develop a full-scale capability in the field of ballistic missile defence; with a focus on strategic ballistic missile defence (hard)*:

The 2002 NPR suggest the further development and deployment of full-scale ballistic missile defence systems (BMD) in the framework of the New Triad. The plans for such a development and deployment had been made by the W. Bush administration in conjunction with its decision to withdraw from the 1972 ABM Treaty. While the treaty had been one of the most reliable U.S.-Soviet treaties for arms control that 'survived' the end of the Cold War, the U.S. government prioritised the risk derived from the contemporary and future developments in North Korea's and Iran's long-range strike capabilities over any strategic concerns by the Russian administration, whose arguments were neglected by the referral to the limitations of the BMD due to the small quantity of interceptors deployed by the U.S.

4.5.2.4 The U.S. extended nuclear deterrence for NATO after the second decade of the post-Cold War era

When discussing the impact of the second decade of the post-Cold War era on the U.S. extended nuclear deterrence, it is useful to recall the politico-military situation that the country was in at the time. Taking into account that the U.S. was mainly government by President W. Bush (2000-2008), the foreign, security and defence policies of the country were deeply focussed on processing the aftershock of the 9/11 terrorist attacks, including the wars in Afghanistan and Iraq that the U.S. had embarked upon, as well as the preparation against military threats from the so-called 'rogue states' (like Iran and North Korea).[1152] Considering that President Obama had underlined the U.S. willingness to work towards a nuclear-free world in his May 2009 speech in Prague, the emphasis on the persistent U.S. reliance for itself and its allies on nuclear weapons appeared contradictory.[1153]

[1151] Credi, O. (2019): US Non-Strategic Nuclear Weapons in Europe: Necessary or Obsolete?, pp. 1 f.. Hyperlink: https://www.jstor.org/stable/resrep19821 (Last visit: 13.02.2023).
[1152] Lindsay, J. (2011): George W. Bush, Barack Obama and the future of US global leadership, pp. 765-779.
[1153] RFERL (2009): Obama, In Prague, Calls For Elimination Of Nuclear Weapons, Hyperlink: https://www.rferl.org/a/Obama_Calls_For_Elimination_Of_Nuclear_Weapons_In_Prague_Speech/1602285.html (Last visit: 05.02.2023).

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However, it should be kept in mind that President Obama had just sketched a vision of the future in his Prague speech, which the U.S. administration considered not necessarily the central guidance for their own policy-making. Quite in line with the 'inverted' nuclear policy stance of Russia, as described in subchapter 4.3.2.1, the U.S. had just declared that it would not use nuclear weapons against non-nuclear states that were in compliance with the 1968 NPT, while it reserved the option of nuclear first-use in case that the country (or its allies) came under an aggressor's conventional or WMD attack for any other country either with nuclear weapons or that is in non-compliance to the 1968 NPT.[1154]

Against this political backdrop, the 2010 NSS reiterated the Obama administration's willingness to continue on the road of further nuclear disarmament, while staying crystal-clear in regard to the U.S. (extended) nuclear deterrent.

> "**Pursue the Goal of a World Without Nuclear Weapons**: While **this goal** will **not be reached during this Administration**, its active pursuit and eventual **achievement** will **increase global security**, […]. **As long as any nuclear weapons exist**, the **United States will sustain** a safe, secure, and effective **nuclear arsenal**, both to **deter potential adversaries** and to **assure U.S. allies** and other security partners that **they can count on America's security commitments**." (2010 NSS)[1155]

Given the dual-message of the 2010 NSS which connected the U.S. extended nuclear deterrence with the political foreign policy goal of the Obama administration, the main risk in the nuclear domain was perceived from terrorists or states that remained non-compliant with the Non-Proliferation Treaty (the 2010 NSS avoided the term 'rogue states' presumably to set a different tone in comparison to the previous U.S. administration).[1156]

The new tone of the 2010 NSS also explicitly covered the U.S. extended deterrence commitment for NATO as one of the key security cornerstones in U.S. strategic thinking.

> "[…] With our **27 NATO allies**, and the many partners with which NATO cooperates, we will **strengthen our collective ability** to promote security, **deter vital threats**, and defend our people. […] And we will continue to anchor our **commitment in Article V**, which is **fundamental to our collective security**." (2010 NSS)[1157]

[1154] Thränert, O. (2011): NATO's Deterrence and Defense Posture Review, pp. 2 f., Hyperlink: https://www.swp-berlin.org/publications/products/comments/2011C34_trt_ks.pdf (Last visit: 07.02.2023).

[1155] Historical Office (2010): National Security Strategy of the United States of America, May 2010, p. 23, Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/NSS2010.pdf?ver=Zt7IeSPX2uNQt00_7wq6Hg%3d%3d (Last visit: 20.01.2023).

[1156] Historical Office (2010): National Security Strategy of the United States of America, May 2010, pp. 23 f., Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/NSS2010.pdf?ver=Zt7IeSPX2uNQt00_7wq6Hg%3d%3d (Last visit: 20.01.2023).

[1157] Historical Office (2010): National Security Strategy of the United States of America, May 2010, pp. 41 f., Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/NSS2010.pdf?ver=Zt7IeSPX2uNQt00_7wq6Hg%3d%3d (Last visit: 20.01.2023).

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The 2010 Quadrennial Defense Review (QDR) further operationalised the 2010 NSS for the U.S. Department of Defense that focussed on its core task, namely providing an adequate nuclear deterrent.

> "The United States is positioned with **capabilities** across all domains to **deter a wide range of attacks or forms of coercion against the United States and its allies**. Until such time as the Administration's goal of a world free of nuclear weapons is achieved, **nuclear capabilities** will be maintained as a **core mission for the Department of Defense**. We will **maintain a safe, secure, and effective nuclear arsenal to deter attack on the United States, and on our allies** and partners." (2010 QDR)[1158]

At this point, an important military element of the 2010 QDR should be highlighted that observers might probably overlook often due to its technical nature, namely the further development of long-strike capabilities in at least two U.S. military branches (Navy and Air Force) that inherit a decisive role in the U.S. global military presence.

> "**Enhanced long-range strike capabilities** are one means of countering growing **threats to forward-deployed forces and bases** and ensuring U.S. power projection capabilities. […] The **Navy** is investigating options for **expanding the capacity** of future Virginia-class attack **submarines for long-range strike**. The **Air Force** is reviewing options for fielding **survivable, long-range surveillance and strike aircraft** as part of a comprehensive, phased plan to **modernize the bomber force**. The Navy and the Air Force are cooperatively assessing alternatives for a **new joint cruise missile**. The Department also plans to **experiment with conventional prompt global strike prototypes**." (2010 QDR)[1159]

The continuous development of long-range strike capabilities with conventional warheads but strategic in design has been an ongoing effort since the 2001 NPR. The new U.S. administration changed rather little in its conception (i.e., relating the tasks of the capability to a regional instead of a global scale, which did, nevertheless, address the known challengers of the U.S. in the Middle East and East Asia).[1160]

The Department of Defense under the Obama administration did, however, not act in continuity in every aspect to the preceding postholders. Considering that the QDR is a high-level politico-military document issued by the U.S. Secretary of Defense, the wording of the Democrat Robert

[1158] Historical Office (2010): Quadrennial Defense Review, March 2010, p. 14, Hyperlink: https://history.defense.gov/Portals/70/Documents/quadrennial/QDR2010.pdf?ver=vVJYRVwNdnGb_00ixF0UfQ%3d%3d (Last visit: 04.02.2023).

[1159] Historical Office (2010): Quadrennial Defense Review, March 2010, pp 32 f., Hyperlink: https://history.defense.gov/Portals/70/Documents/quadrennial/QDR2010.pdf?ver=vVJYRVwNdnGb_00ixF0UfQ%3d%3d (Last visit: 04.02.2023).

[1160] US Congressional Research Service (2021): Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues, pp. 1-10, Hyperlink: https://sgp.fas.org/crs/nuke/R41464.pdf (Last visit: 06.02.2023).

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Gates regarding the consultation in defence matters with the U.S.' allies, especially within the remit of NATO, promoted a quite different approach to the one of former Republic Secretary of Defense Rumsfeld, who distinguished the U.S. allies in Europe in accordance with their position to the 2003 U.S. invasion of Iraq.[1161]

> "To **reinforce U.S. commitments to our allies** and partners, we will **consult closely** with them on new, **tailored, regional deterrence architectures** that **combine our forward presence, relevant conventional capabilities (including missile defenses), and continued commitment to extend our nuclear deterrent**." (2010 QDR)[1162]

While the tone of the Obama administration in its 2010 NSS and 2010 QDR had been quite accommodating towards its allies, the statements regarding the retention of the U.S. nuclear arsenal remained an ambivalent signal to third states with large established nuclear arsenals themselves, especially Russia. The positive rhetoric regarding cooperation with partners and other third states, such as Russia and the U.S. pursuit of a nuclear-free world culminated in at least one substantial agreement towards the goal of nuclear 'zero', namely the 2010 New START Treaty, which was presented in subchapter 4.2.3 as part of the landscape of U.S.-Russian nuclear disarmament treaties.

Beside the changes in the nuclear deterrent, as agreed with Russia in the bilateral 2010 New START Treaty, the U.S. nuclear deterrence policy remained practically unchanged from the one of its predecessors (again, with the expression of a stronger consultation with the U.S. allies).

In this sense, the 2010 NPR formulated the following tasks for the nuclear components of the U.S. armed forces as well as for the related governmental side involved in that topic (e.g., via the diplomatic channels to the U.S. allies in Europe):

> "[…]
> - Retain the **capability to forward-deploy U.S. nuclear weapons on tactical fighter-bombers and heavy bombers**, and proceed with full scope life extension for the B-61 bomb including enhancing safety, security, and use control.
> - Continue to **maintain and develop long-range strike capabilities** that supplement U.S. forward military presence and strengthen regional deterrence.

[1161] Rumsfeld's distinction was formulated in the catchy 'Old Europe' versus 'New Europe' dichotomy that separated the supportive pro-invasion Eastern European NATO members from the negatively perceived invasion-sceptic Western European NATO members (especially Germany and France). The distinction was, nevertheless, not accurate, because the UK, Spain and Italy had backed the U.S. versus Iraq as well. See: RFERL (2003): U.S.: Rumsfeld's 'Old' And 'New' Europe Touches On Uneasy Divide, Hyperlink: https://www.rferl.org/a/1102012.html (Last visit: 05.02.2023).

[1162] Historical Office (2010): Quadrennial Defense Review, March 2010, p. 14, Hyperlink: https://history.defense.gov/Portals/70/Documents/quadrennial/QDR2010.pdf?ver=vVJYRVwNdnGb_00ixF0UfQ%3d%3d (Last visit: 04.02.2023).

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- **Continue and, where appropriate, expand consultations with allies** and partners to address how to **ensure the credibility and effectiveness of the U.S. extended deterrent**. **No changes in U.S. extended deterrence capabilities will be made without close consultations** with our allies and partners." (2010 NPR)[1163]

Taking the geopolitical context of a strategic balance in the post-cold War era into account, the U.S. remarked expressively that it identified, *inter alia*, Russia's and China's nuclear modernisation programmes as a direct reaction to the U.S. development long-range strike capabilities as well as the efforts in missile defence (this subtopic is addressed further below in this subchapter). Thus, an offensive-defensive military high-technology arms race[1164] was already unfolding throughout the first decade of the 21st century.

> "Given that **Russia** and China are currently **modernizing their nuclear capabilities** – and that both are **claiming U.S. missile defense and conventionally-armed missile programs are destabilizing – maintaining strategic stability** with the two countries will be an **important challenge in the years ahead**." (2010 NPR)[1165]

In view of this potential arms race, the U.S. government under President Obama considered the use of diplomatic exchanges as the central instrument in accommodating concerns by Russia, while gaining further information on Russia's intentions in regard to their military modernisation activities, including the role of nuclear weapons in Russia's politico-military thinking.

> "A **strategic dialogue with Russia** will allow the United States to explain that our **missile defenses** and **any future U.S. conventionally-armed long-range ballistic missile systems** are designed to address newly emerging regional threats, and are **not intended to affect the strategic balance with Russia**. For its part, **Russia** could explain its modernization programs, **clarify its current military doctrine (especially the extent to which it places importance on nuclear weapons)**, and discuss steps it could take to allay concerns in the West about its **non-strategic nuclear arsenal**, such as further consolidating its non-strategic systems in a small number of secure facilities deep within Russia." (2010 NPR)[1166]

[1163] US Department of Defense (2010): Nuclear Posture Report, April 2010, p. xiii f. (Executive Summary), Hyperlink: https://dod.defense.gov/Portals/1/features/defenseReviews/NPR/2010_Nuclear_Posture_Review_Report.pdf (Last visit: 06.01.2022).

[1164] The theoretical foundation of such arms races was shown in subchapter 2.4.4.

[1165] US Department of Defense (2010): Nuclear Posture Report, April 2010, p. 28, Hyperlink: https://dod.defense.gov/Portals/1/features/defenseReviews/NPR/2010_Nuclear_Posture_Review_Report.pdf (Last visit: 06.01.2022).

[1166] US Department of Defense (2010): Nuclear Posture Report, April 2010, pp. 28 f., Hyperlink: https://dod.defense.gov/Portals/1/features/defenseReviews/NPR/2010_Nuclear_Posture_Review_Report.pdf (Last visit: 06.01.2022).

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This diplomatic approach of exchanging concerns in order to enable the building of a mutually acceptable solutions[1167], e.g., through trust-building measures, was also pursued regarding Russia's long-time issue of the U.S. ballistic missile defence.

> "Both **Russia** and China have repeatedly **expressed concerns that U.S. missile defenses adversely affect their own strategic capabilities and interests**. The United States will continue to engage them on this issue to help them better understand the **stabilizing benefits of missile defense** […]" (2010 BMD Review)[1168]

At the same time, the U.S. continued on its supportive track towards its NATO allies by further promoting the establishment of a ballistic missile defence system in Europe, which it dubbed "European Phased Adaptive Approach" (EPAA).

> "The United States has been working closely with NATO allies on the relationship of the **European PAA to the Alliance's missile defense plans**. In addition to these NATO-wide consultations, the **Czech Republic and Poland**, both close allies, continue to play an **important role in our collective missile defense efforts**." (2010 BMD Review)[1169]

In order to publicly communicate the willingness to meet Russia's concerns regarding the implications of the deployment of a ballistic missile defence system in Europe, the U.S. publicly communicated contemplations about including Russia in the operational aspects, when the system would be deployed, while noting that it would not design the system in a way that Russia could interfere in the operative capacity of the European BMD.

> "One of the benefits of the **European Phased Adaptive Approach** is that it **allows for a Russian contribution** if political circumstances make that possible. For example, **Russian radars could contribute** useful and welcome **tracking data**, although the **functioning of the U.S. system will not be dependent on that data**." (2010 BMD Review)[1170]

Following the application of the four operational indicators in Table 89 of subchapter 4.5.2.1 on the 2010 Nuclear Posture Review in the context of the specialised 2010 BMD Review, the general military context of the 2010 Quadrennial Defense Review, and the

[1167] The theoretical foundation of such mutually acceptable change of the *status quo* by two or more bargaining actors was introduced in subchapter 2.4.5.
[1168] US Department of Defense (2010): Ballistic Missile Defense Review Report, February 2010, pp. Hyperlink: https://dod.defense.gov/Portals/1/features/defenseReviews/BMDR/BMDR_as_of_26JAN10_0630_for_web.pdf (Last visit: 04.02.2023).
[1169] US Department of Defense (2010): Ballistic Missile Defense Review Report, February 2010, pp. 24, Hyperlink: https://dod.defense.gov/Portals/1/features/defenseReviews/BMDR/BMDR_as_of_26JAN10_0630_for_web.pdf (Last visit: 04.02.2023).
[1170] US Department of Defense (2010): Ballistic Missile Defense Review Report, February 2010, pp. 34, Hyperlink: https://dod.defense.gov/Portals/1/features/defenseReviews/BMDR/BMDR_as_of_26JAN10_0630_for_web.pdf (Last visit: 04.02.2023).

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political overall framework of the 2010 National Security Strategy, the U.S. employed a 'hard' nuclear deterrence posture in the initial-Cold War era despite the rhetoric of U.S. President Obama's to strive for a world without nuclear weapons[1171].

The individual results from the evaluation of the four indicators leading to that inconclusive result were the following:

(1) *Retain/weaken the military warfare role of nuclear weapons in the defender's nuclear defence policy (soft)*:

In view of the 2009 Prague speech of President Obama who promoted the vision of a nuclear-free world, the U.S. did not promote an active military warfare role of its nuclear weapons. However, the U.S. administration did not promote unilateral disarmament without considerations to the strategic balance towards Russia (and other nuclear powers) and the U.S. commitments toward its allies in Europe and other parts of the world (especially East Asia). Thus, the U.S. nuclear policy remained with the generic *rationale* that "As long as any nuclear weapons exist, the United States will sustain […] a [...] nuclear arsenal, both to deter potential adversaries and to assure U.S. allies […]." (2010 NSS)[1172]

(2) *Developing a post-status quo role for the defender's (extended) nuclear deterrent within the remit of its nuclear defence policy (hard)*:

To a certain extent, the Obama administration's standing appears as the opposite of the previous W. Bush administration due to its dual-approach of reconnecting with its allies (via NATO in Europe) and engaging third states such as Russia through cooperative security proposals, for example in line with the 2010 New START Treaty. Nevertheless, despite the rhetoric, two things should not be forgotten. Firstly, the U.S. maintained its national BMD and continued to develop an additional one as part of its commitments to NATO in Europe (EPAA). While the U.S. promoted cooperation with Russia on that issue, it is still willing to continue unilaterally with its allies.

Secondly, due to U.S. administration's proposal for the 2010 New START Treaty as well as the ambition to continue upon the course of further nuclear disarmament, it has put Russia in a politico-military difficult position because of the increasing military capability gap between both powers in terms of conventional capabilities. In the same vein, if the U.S.

[1171] US White House (2009): Remarks By President Barack Obama In Prague As Delivered, Hyperlink: https://obamawhitehouse.archives.gov/the-press-office/remarks-president-barack-obama-prague-delivered (Last visit: 14.02.2023).

[1172] Historical Office (2010): National Security Strategy of the United States of America, May 2010, p. 23, Hyperlink: https://history.defense.gov/Portals/70/Documents/nss/NSS2010.pdf?ver=Zt7IeSPX2uNQt00_7wq6Hg%3d%3d (Last visit: 20.01.2023).

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pushes for further disarmament in nuclear warheads and delivery systems while building up its own national defensive and offensive missile capabilities, *inter alia*, through a conventional global strike capability, Russia might face a tilt in the strategic balance in favour of the U.S. (and the more potent rising rival China).

(3) *Enhance the defender's commitments to the military alliance through extended nuclear deterrence (hard)*:

In regard to the U.S. extended nuclear deterrence to its allies in Europe, including NATO in particular, as the U.S. continuously stressed throughout all high-level politico-military documents that the key aspect of taking decisions in regard to the U.S. extended nuclear deterrent occurs only after consultation with its allies. This insight might partially rest on the lessons learned of the U.S. administration from its preceding administration that antagonised part of its NATO allies in Europe.[1173]

(4) *Develop a full-scale capability in the field of ballistic missile defence; with a focus on strategic ballistic missile defence (hard)*:

Within the remit of 2010 QDR, the 2010 NPR and the 2010 BMDR, the U.S. administration reinforced its politico-military goals for its military capabilities that should be able to engage regional challengers through conventional air- and sea-based long-range strike capabilities in conjunction with the deployment of a strategic ballistic missile defence system to protect the mainland U.S. from global limited ballistic missile threats (and in the medium- to long-term for NATO as well).

4.5.3 U.S. post-Cold War nuclear capabilities

This subchapter consists of four further subchapters. Subchapter 4.5.2.1 provides a general introduction to the analysis of the available strategic nuclear weapons in the U.S. arsenal in accordance with information extracted from the 1991 START I Treaty and the 2010 New START Treaty (see subchapter 4.2.3). The subchapters 4.4.2.2 to 4.4.2.4 are dedicated to three legs of the nuclear triad, namely ground-based, sea-based, and air-based nuclear deterrents. The overall results from the analysis are collected and presented in conjunction with the results from subchapter 4.5.3 in the interim conclusion on the U.S. (extended) strategic nuclear deterrence throughout the examined periods in subchapter 4.5.4.

[1173] Grote. I. (2007): Donald Rumsfeld's Old and New Europe and the United States' Strategy to Destabilize the European Union, pp. 347-356.

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4.5.3.1 Introduction

For substantiating the examination of the U.S. nuclear deterrent's credibility in the previous subchapter 4.5.3 with quantitatively measurable evidence, this section is dedicated to the U.S. nuclear capabilities from a warfighting perspective. Pundits of the topic of nuclear deterrence might argue in the same vein as two former presidents from the U.S. and USSR that "[a] nuclear war cannot be won and must never be fought" (Reagan/Gorbachev)[1174].

Nevertheless, representatives of nuclear deterrence theory from the 1950s and 1960s, such as Schelling, had early acknowledged that the threat of nuclear war due to "contingently irrational behaviour" (Rhodes) was not only a possibility but an important cornerstone of a credible nuclear deterrence.[1175] Within the remit of PDT, the use of nuclear weapons represents rather a question of procedural rationality relying on the set of beliefs and perceptions of the nuclear-armed states' decision-makers.[1176] Given that the theoretical framework of this dissertation focuses both on credibility and capabilities, the logical consequence is to include the capability-related characteristics of the U.S. nuclear arsenal in the analysis.

In view of the large variety of missiles, bombs and warheads that belong to the nuclear field, the distinction between weapons with a strategic role and those with a non-strategic (tactical) role requires some basic understanding.[1177] In this section, the focus is placed on strategic nuclear weapons pertaining to the U.S. nuclear triad: (1) land-based missile systems with extensive ranges, known as Intercontinental Ballistic Missiles (*or* ICBMs), (2) submarine-launched ballistic missiles (*or* SLBMs) carried by usually nuclear-powered submarines, and (3) air-launched cruise missiles (*or* ALCM) carried and launched by heavy bombers.[1178]

For identifying the relevant types of weapon systems belonging to the U.S. nuclear triad, this doctoral thesis applies of the 'Definition by Exclusion' approach which the US Congressional Service has used in his 2022 report on nonstrategic nuclear weapons.[1179]

[1174] European Leadership Network (2021): The Reagan-Gorbachev Statement: Background to #ReaffirmOurFuture, Hyperlink: https://www.europeanleadershipnetwork.org/commentary/the-reagan-gorbachev-statement-background-to-reaffirmourfuture/ (Last visit: 13.11.2022).

[1175] Rhodes, E. (1988): Nuclear Weapons and Credibility: Deterrence Theory beyond Rationality, pp. 47 f. and pp. 52-55.

[1176] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 94.

[1177] US Congressional Research Service (2022): Nonstrategic Nuclear Weapons, p. 8, Hyperlink: https://sgp.fas.org/crs/nuke/RL32572.pdf (Last visit: 06.01.2022).

[1178] For more detailed information on the U.S. nuclear triad, see: US Department of Defense (n.a.): America's Nuclear Triad, Hyperlink: https://www.defense.gov/Multimedia/Experience/Americas-Nuclear-Triad/ (Last visit: 06.01.2022); and: US Department of Defense (2020): Factsheet: The Importance of Modernising the Nuclear Triad, p. 1, Hyperlink: https://media.defense.gov/2020/Nov/24/2002541293/-1/-1/1/FACTSHEET-THE-IMPORTANCE-OF-MODERNIZING-THE-NUCLEAR-TRIAD.PDF (Last visit: 05.01.2022).

[1179] US Congressional Research Service (2022): Nonstrategic Nuclear Weapons, p. 10, Hyperlink: https://sgp.fas.org/crs/nuke/RL32572.pdf (Last visit: 06.01.2022).

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In this sense, the bilateral nuclear disarmament treaties 1991 START I and 2010 New START are used as point of departure for identifying the specific military equipment that forms the three legs of the nuclear triad. Since this subchapter is only concentrated on the U.S., Table 90 below is extracted from information in subchapter 4.2.3.

Missiles/Launcher systems	*1991 START I*	*2010 New START*
ICBM (fixed)	Minuteman II Minuteman III	Minuteman II* Minuteman III
ICBM (mobile)	Peacekeeper	Peacekeeper*
SLBM	Poseidon Trident I Trident II	Trident II
Heavy bombers	B-52 B-1 B-2	B-52G B-52H B-1B** B-2A
Heavy bomber armaments	AGM-86B AGM-129	*Not indicated*

* Missiles from this type were dismantled by the time of the 2010 New START Treaty's signing.
** The B-1 was fully converted to a conventional combat role after 2007.

Table 90: The U.S. Strategic Nuclear Triad comparison 1991-2010, derived from the 1991 START I and 2010 New START treaties[1180]

4.5.3.1 The land-based nuclear deterrent

Taking into account that the designations and their underlying military capabilities of the different nuclear weapons might only be familiar to readers with a military background, the respective weapon systems grouped under the category 'Missile/Launcher systems' are going to be briefly introduced.

Since its first deployment in 1970, the land-based leg of the U.S. nuclear triad is represented by the Minuteman III. It is an intercontinental ballistic missile (ICBM) with a range of 13.000 km that can carry up to three nuclear warheads in MIRV configuration, which means that 500 Minuteman could deliver a maximum of 1.500 nuclear warheads to their targets. The destructive power of the ICBM depends on the chosen warhead(s). Sample warheads in use are the W78 at 335 kiloton TNT equivalent or the W87 with 300 kiloton TNT equivalent.[1181] The

[1180] NTI (n.a.): Treaty between the United States of America and the Union of Socialist Soviet Republics on the further Reduction and Limitation of Strategic Offensive Arms (START I), p. TSTARTI-6, Hyperlink: https://media.nti.org/documents/start_1_treaty.pdf (Last visit: 19.12.2022); and NTI (n.a.): Treaty between the United States of America and the Russian Federation on Measures for the further Reduction and Limitation of Strategic Offensive Arms (New START), p. 3, Hyperlink: https://www.nti.org/wp-content/uploads/2021/09/new_start_treaty.pdf (Last visit: 19.12.2022).

[1181] Despite the U.S. nuclear planning for a single-warhead land-based deterrence, the Minuteman III is principally able to carry up to three nuclear warheads (but with lower yield in comparison to a larger single warhead). See: Missile Threat (2021): Minuteman III, Hyperlink: https://missilethreat.csis.org/missile/minuteman-iii/ (Last visit: 03.12.2022).

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Minuteman III missiles are operated by the U.S. Air Force and scattered across three remote bases in Wyoming, Montana, and North Dakota.[1182]

In both 1991 START and 2010 New START treaties, the Minuteman II ICBM was included by the negotiating parties even though the missile type had already been decommissioned for long-time by the signature states of the 2010 New START. This missile type saw deployment from 1965 to 1994 and provided the U.S. with a nuclear missile system with one of longest period of service. The missile had a range of 12.500 km and was equipped with a single W-56 warhead with the nuclear yield of 1.2 megaton TNT equivalent. By 1990, when the START I Treaty was negotiated between the U.S. and USSR, 450 Minuteman II were in active service. Following the adoption of START I and with a more advanced missile in-service (the successor Minuteman III), the Minuteman II ICBMs were eventually decommissioned in 1994.[1183]

For the next missile type, ICBM (mobile), the U.S. had only one type of missile in their arsenal throughout the post-Cold War time: The Peacemaker. From 1986 to 2005, the U.S. had deployed the Peacemaker ICBM with a range of 9.600 km that was technically able to carry 12 warheads in MIRV configuration. As main targets of this missile, the hardened underground silos of Soviet/Russian ICBMs were selected in order to degrade the adversary's second-strike capability. Due to the START I Treaty's limitation, MIRV had to be restricted to 10 warheads per missile, which the U.S. had subsequently respected in the Peacemaker's factual payload. The warhead variant used for this missile was the W87 with a nuclear yield of 300-475 kiloton TNT equivalent.[1184]

The Peacemaker had been produced as both a silo-based fixed and a rail-mobile ICBM. The U.S. Airforce operated 25 rail trains that were kept on high-alert in the Cold War and should have moved across the U.S. rail network to evade a counterforce first-strike. The rail-based system was already decommissioned in 1991, when the end of the Cold War was foreseeable.[1185] Throughout its deployment period, the U.S. had an active total of fixed 50 Peacemaker ICBM. Starting in 2002, the U.S. began dismantling the Peacemaker arsenal, which was completed by 2005.[1186] Thus, the same condition for the Peacemaker applies that has

[1182] US Air Force Nuclear Weapons Center (n.a.): Minuteman III (LGM-30G), Hyperlink: https://www.afnwc.af.mil/Weapon-Systems/Minuteman-III-LGM-30G/ (Last visit: 05.01.2022).
[1183] Missile Threat (2021): Minuteman II, Hyperlink: https://missilethreat.csis.org/missile/minuteman-ii/ (Last visit: 05.01.2022).
[1184] Missile Threat (2021): LGM-118 Peacekeeper (MX), Hyperlink: https://missilethreat.csis.org/missile/lgm-118-peacekeeper-mx/ (Last visit: 05.01.2022).
[1185] US Air Force (n.a.): Peacekeeper Rail Garrison Car, Hyperlink: https://www.warren.af.mil/About-Us/Fact-Sheets/Display/Article/2869113/peacekeeper-rail-garrison-car/ (Last visit: 06.01.2022).
[1186] Missile Threat (2021): LGM-118 Peacekeeper (MX), Hyperlink: https://missilethreat.csis.org/missile/lgm-118-peacekeeper-mx/ (Last visit: 05.01.2022).

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already been mentioned within the remit of the Minuteman II: The missile was mentioned for unknown reasons in the 2010 New START even though it had been deactivated already five years before the treaty's signing.

Summarising the land-based part of the nuclear triad, the Minuteman III remains the only ICBM available to the U.S., which is planned to eventually be replaced by the ground-based strategic deterrent system (GBSD). In line with the current U.S. nuclear deterrence policy, the land-based nuclear deterrence will foreseeably remain active until at least the 2070s (expected lifetime of the GBSD). This is due to the quick response time of the respective command-and-control system, which can ensure a U.S. nuclear reaction in the event that a foreign nuclear-armed state launches a surprise nuclear first strike against the U.S. (and potentially its allies).[1187]

4.5.3.3 The sea-based nuclear deterrent

The sea-based leg of the nuclear triad in the form of the submarine-launched ballistic missile (*or* SLBM) represents an important cornerstone of the U.S. nuclear arsenal. Since submerged submarines armed with SLBM could travel closer to the adversary's shores, this type of weapon enables options for both first- and second-strike operations due to the unknown location of the submarine before and the short reaction time after launch.[1188] The U.S. active SLBM is the Trident II (*or* Trident D5), which was first commissioned in the U.S. Navy in 1990. This missile has a minimum distance requirement of 2.000 km from its target (due to the ballistic trajectory flight), but a maximum range of 12.000 km. While technically able to carry 12 warheads in the MIRV configuration, the U.S. remained within the 2010 New START Treaty's limits of eight warheads. The types of warheads could be either the W76 with 100 kiloton yield or a W88 with 475 kiloton yield TNT equivalent. The missile has a high precision that can be used against hardened targets in order to execute counterforce strikes.[1189]

Within the remit of the 1991 START I Treaty, two further missiles had been mentioned that became obsolete during the post-Cold War era. The Poseidon was in service from 1971 until 1996 and had a range of 5.300 km. The missile was MIRV capable and could carry up to ten

[1187] US Department of Defense (2020): Factsheet: The Importance of Modernising the Nuclear Triad, p. 2, Hyperlink: https://media.defense.gov/2020/Nov/24/2002541293/-1/-1/1/FACTSHEET-THE-IMPORTANCE-OF-MODERNIZING-THE-NUCLEAR-TRIAD.PDF (Last visit: 05.01.2022).

[1187] US Congressional Research Service (2022): Nonstrategic Nuclear Weapons, pp. 8-11, Hyperlink: https://sgp.fas.org/crs/nuke/RL32572.pdf (Last visit: 06.01.2022).

[1188] Langer, A. (1977): Accurate Submarine Launched Ballistic Missiles and Nuclear Strategy, p. 45 f.

[1189] Missile Threat (2021): Trident D5, Hyperlink: https://missilethreat.csis.org/missile/trident/ (Last visit: 27.12.2022).

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W-68 warheads with a yield of 50 kiloton TNT equivalent.[1190] The Trident I (*or* Trident C4) was a successor of the Poseidon and the predecessor of the Trident II. The missile could carry eight W-76 warheads with each having a yield of 100 kiloton TNT equivalent.[1191] The missile had a range of 7.360 km[1192] and was deployed from 1979 till 2005[1193].

In order to fully understand the sea-based leg of the U.S. nuclear triad, SLBMs must be valued in conjunction with the carrier. The U.S. navy has deployed the first of the Ohio-class submarines in 1982. Throughout the post-Cold War, 14 of the original 18 submarines of this class have been in use for the U.S. sea-based nuclear deterrent[1194], while four were refitted after the 1994 NPR in order to serve as conventional guided-missile submarines[1195]. An Ohio-class submarine has a total of 24 launch tubes for Trident II SLBM, but the 2010 New START Treaty restricted the submarines to reduce the capability by four with a maximum allowance of 20 launch tubes per submarine. The Nuclear Threat Initiative (NTI) think tank estimated that due to this and further restrictions, the whole U.S. Ohio-class fleet might be able to have a total of approximately 720 warheads available for launch (from a technical maximum estimate of 1.152 warheads).[1196] Considering that, the U.S. has already decided to replace the 14 Ohio-class submarines with 12 of the to-be-developed Colombia-class from 2030 onward for ensuring continuous deterrence operations at sea at a minimum amount deemed necessary.[1197]

4.5.3.4 The air-based nuclear deterrent

Lastly, considering that bombers were the first platforms that deployed nuclear weapons against imperial Japan at the end of the Second World War, heavy bombers together with their nuclear ordnance, can easily be identified as the historically oldest part of the nuclear triad. Derived from the experience of the use of nuclear weapons on Hiroshima and Nagasaki, the U.S.

[1190] Missilery.info (n.a.): UGM-73A Poseidon-C3 strategic missile system, Hyperlink: https://en.missilery.info/missile/poseidon (Last visit: 05.01.2022).
[1191] Missilery.info (n.a.): UGM-96A Trident-1 C-4 submarine ballistic missile, Hyperlink: https://en.missilery.info/missile/trident1 (Last visit: 06.01.2022).
[1192] AtomicArchive (n.a.): Trident I C-4, Hyperlink: https://www.atomicarchive.com/almanac/forces/trident-c4.html (Last visit: 06.01.2022).
[1193] GlobalSecurity (n.a.): Trident I C-4 FBM / SLBM, Hyperlink: https://www.globalsecurity.org/wmd/systems/c-4.htm (Last visit: 06.01.2022).
[1194] US Department of Defense (2020): Factsheet: The Importance of Modernising the Nuclear Triad, p. 3, Hyperlink: https://media.defense.gov/2020/Nov/24/2002541293/-1/-1/1/FACTSHEET-THE-IMPORTANCE-OF-MODERNIZING-THE-NUCLEAR-TRIAD.PDF (Last visit: 05.01.2022).
[1195] Military.com (n.a.): SSGN - Ohio Class Guided Missile Submarine, Hyperlink: https://www.military.com/equipment/ssgn-ohio-class-guided-missile-submarine (Last visit: 06.01.2022).
[1196] NTI (2021): United States Submarine Capabilities, Hyperlink: https://www.nti.org/analysis/articles/united-states-submarine-capabilities/ (Last visit: 07.01.2022).
[1197] US Department of Defense (2020): Factsheet: The Importance of Modernising the Nuclear Triad, p. 3, Hyperlink: https://media.defense.gov/2020/Nov/24/2002541293/-1/-1/1/FACTSHEET-THE-IMPORTANCE-OF-MODERNIZING-THE-NUCLEAR-TRIAD.PDF (Last visit: 05.01.2022).

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developed a first strategic deterrent based on the atomic bomb to dissuade the Soviet Union from attempting to militarily conquer Europe and parts of the Middle East through its conventional military dominance in the early Cold War.[1198]

On the basis of the 1991 START I and 2010 New START treaties, three different types of aircraft have been defined as strategic nuclear bombers: The B-52 Stratofortress, the B-1 Lancer and the B-2 Spirit.

The B-52 is based on by far the oldest airframe of the three models. The A variant of the plane had its maiden voyage in 1954, while the last plane of the currently used H variant[1199] had already been built in 1962. The bomber can carry up to 20 ALCM, has an unrefuelled combat range of approximately 14.080 km, and its home air bases are located in North Dakota and Louisiana.[1200]

While the B-52 has the look of a traditional airplane and the role of a 'workhorse' in the U.S. Air Force's air-based nuclear deterrence, the B-2 Spirit is a truly futuristic delta-wing stealth bomber, which was officially commissioned in 1993. The home air base of all B-2 is located in Missouri and have an unrefuelled range of around 9.600 km.[1201] In regard to its weapons payload, the B-2 can carry up to 16 ALCM.[1202] In regard to the triad's modernisation, the B-2 is planned to be replaced by the B-21 Raider in the late 2020s. The planned quantity for the B-21 was set at 100 aircraft.[1203]

The development of the B-1 Lancer already began in the 1970s with the intention to replace the older B-52 with it. After project cancellation, an updated version was begun in 1982. The newer variant reached initial operating capability in 1986.[1204] The aircraft was able to carry eight ALCM and an unrefuelled range of 7.400 km.[1205] After 1994, the U.S. removed the B-1 from

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[1198] Young, K. (2007): US 'Atomic Capability' and the British Forward Bases in the Early Cold War, pp. 118 f.

[1199] It should be remarked that the B-52 has underwent modernisation and life-extension programmes in order to remain combat-ready. See, e.g. the latest rejuvenation that aims at keeping the B-52 deployable till 2050: Breaking Defense (2022): With new radar and engines in sight, the B-52 gets ready for 'largest modification in its history', Hyperlink: https://breakingdefense.com/2022/08/with-new-radar-and-engines-in-sight-the-b-52-gets-ready-for-largest-modification-in-its-history/ (Last visit: 06.01.2022).

[1200] US Air Force (2019): B-52H Stratofortress, Hyperlink: https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104465/b-52h-stratofortress/ (Last visit: 08.12.2022).

[1201] US Air Force (2015): B-2 Spirit, Hyperlink: https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104482/b-2-spirit/ (Last visit: 06.01.2022).

[1202] MilitaryToday (n.a.): Northrop Grumman B-2 Spirit, Hyperlink: http://www.military-today.com/aircraft/b2_spirit.htm (Last visit: 06.01.2022).

[1203] US Department of Defense (2020): Factsheet: The Importance of Modernising the Nuclear Triad, p. 4, Hyperlink: https://media.defense.gov/2020/Nov/24/2002541293/-1/-1/1/FACTSHEET-THE-IMPORTANCE-OF-MODERNIZING-THE-NUCLEAR-TRIAD.PDF (Last visit: 05.01.2022).

[1204] US Air Force (2016): B-1B Lancer, Hyperlink: https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104500/b-1b-lancer/ (Last visit: 06.01.2022).

[1205] Encyclopedia Britannica (n.a.): B-1, bomber aircraft, Hyperlink: https://www.britannica.com/technology/B-1-bomber-aircraft (Last visit: 06.01.2022).

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its strategic nuclear deterrent, while the plane was still capable of deploying nuclear weapons until 2007. After that date and in accordance with the 1991 START I and 2010 New START treaties, the aircraft was technically refitted to a conventional bomber role.[1206]

In regard to heavy bomber armaments, the 1991 START I Treaty mentions two specific ALCM types, namely the AGM-86B and the AGM-129.

Of those two ALCMs, the AGM-86B has been in service since 1982 and remains so until the low-observable, long-range, and survivable cruise missile (LRSO) development has been completed.[1207] The missile has a range of more than 2.400 km and W80 warhead with a variable yield between 5 to 150 kiloton TNT equivalent.[1208] The AGM-129 was first commissioned in 1990 and designed as stealth, nuclear-capable ACLM for the B-52.[1209] This missile has a range of 3.000 km and uses the same W80 warhead like the AGM-86B with the same parameters (variable yield between 5 to 150 kiloton TNT equivalent).[1210]

In addition to the above ALCMs, the U.S. also uses a few variants of the B61 nuclear gravity bombs as strategic weapons in heavy bombers. The overall U.S. stockpile of the B61 consist of a total of approximately 825 bombs for five B61 variants, thereof the strategic variants B61-7 (290 stockpiled bombs with a yield of 10-360 kiloton TNT equivalent) and B61-11 (35 stockpiled bombs with a yield of 400 kiloton TNT equivalent) could be potential payloads of the B-52, B-2, and B-1 (till 2007).[1211]

4.5.3.5 The development of the U.S. nuclear triad in the post-Cold War era

Following the comprehensive introduction to the details of the individual types of nuclear weapons, the remainder of this sections presents the development of the nuclear triad throughout the post-Cold War era to complete the capability picture of the U.S. extended deterrence for NATO.

	Land domain	*Maritime domain*	*Air domain*
1993 BUR (plan for 2003)	500 Minuteman III ICBM (planned as	18 Ohio-class SSBN with multiple Trident	Up to 94 B-52H with ALCM, 20 B-2 with ALCM

[1206] US Air Force (2016): B-1B Lancer, Hyperlink: https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104500/b-1b-lancer/ (Last visit: 06.01.2022).
[1207] US Department of Defense (2020): Factsheet: The Importance of Modernising the Nuclear Triad, p. 4, Hyperlink: https://media.defense.gov/2020/Nov/24/2002541293/-1/-1/1/FACTSHEET-THE-IMPORTANCE-OF-MODERNIZING-THE-NUCLEAR-TRIAD.PDF (Last visit: 05.01.2022).
[1208] MilitaryToday (n.a.): AGM-86B ALCM, Hyperlink: http://www.military-today.com/missiles/agm_86b_alcm.htm (Last visit: 06.01.2022).
[1209] US Air Force (n.a.): AGM-129A Advanced Cruise Missile, Hyperlink: https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104543/agm-129a-advanced-cruise-missile/ (Last visit: 06.01.2022).
[1210] MilitaryToday (n.a.): AGM-129 ACM, Hyperlink: http://www.military-today.com/missiles/agm_129_acm.htm (Last visit: 06.01.2022).
[1211] Kristensen, H./Norris, R. (2014): The B61 family of nuclear bombs, pp. 79-82.

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	single-warhead missiles)	C-4 and Trident D-5 SLBM	
2002 NPR (plan for 2012)	500 Minuteman III ICBM [no mention of MIRV]	14 Ohio-class SSBN with multiple Trident C-4 and Trident D-5 SLBM	76 B-52H with ALCM, 21 B-2 with ALCM
2010 NPR (plan for 2020)	De-MIRVed Minuteman III ICBM [no mention of missile reductions]	14 Ohio-class SSBN with Trident D-5 SLBM	Less than 76 B-52H [some to be converted to conventional role] 21 B-2
As-Is 2020	400 single-warhead Minuteman III ICBM	14 Ohio-class SSBN with 240 Trident D-5 SLBM	46 B-52H with ALCM and gravity bombs 20 B-2 with ALCM and gravity bombs

Table 91: The U.S. strategic nuclear triad, as planned for 2003[1212], 2012[1213], 2010[1214], and 2020[1215]

Table 83 above depicts the evolution of the U.S. nuclear triad from the 1993 Bottom-Up Review (BUR) until the as-is situation of 2020. The Nuclear Posture Reviews of 2002 and 2010 have been taken into account to fill the gaps in between, but information on the U.S. nuclear deterrent remains difficult to obtain due to the partial classification of the necessary documents.[1216]

In the land domain, the Minuteman III remained at a relatively stable quantity throughout the post-Cold War era. Two important capability changes were made in that domain: (1) Under the W. Bush administration, the U.S. decommissioned the 50 remaining Peacemaker with a MIRV configuration in 2005, and (2) under the succeeding Obama administration, the U.S. decided to remove the MIRV from the remaining Minuteman III ICBM. Both decisions together basically led to the complete removal of multiple warheads from all U.S. land-based ICBMs. There were no direct comments by NATO on potential risks related to the MIRV removal from U.S. land-based arsenals, but three strong indicators imply that NATO did not consider the loss of the MIRV a decrease of the U.S. extended deterrence's capability: The first one was set in the December 1997 final communiqué of the North Atlantic Council in the defence ministers' format, wherein NATO welcomed the results from the U.S.-Russian continued consultations

[1212] Historical Office (1993): Report on the Bottom-Up Review, p. 26, Hyperlink: https://history.defense.gov/Portals/70/Documents/dod_reforms/Bottom-upReview.pdf (Last visit: 03.12.2022).
[1213] FAS (2002): Nuclear Posture Review [Excerpts], p. 4, Hyperlink: https://uploads.fas.org/media/Excerpts-of-Classified-Nuclear-Posture-Review.pdf (Last visit: 06.01.2022).
[1214] US Department of Defense (2010): Nuclear Posture Report, April 2010, pp. 22-25, Hyperlink: https://dod.defense.gov/Portals/1/features/defenseReviews/NPR/2010_Nuclear_Posture_Review_Report.pdf (Last visit: 06.01.2022).
[1215] US Department of Defense (n.a.): America's Nuclear Triad, Hyperlink: https://www.defense.gov/Multimedia/Experience/Americas-Nuclear-Triad/ (Last visit: 06.01.2022); and: US Department of Defense (2020): Factsheet: The Importance of Modernising the Nuclear Triad, p. 1, Hyperlink: https://media.defense.gov/2020/Nov/24/2002541293/-1/-1/1/FACTSHEET-THE-IMPORTANCE-OF-MODERNIZING-THE-NUCLEAR-TRIAD.PDF (Last visit: 05.01.2022).
[1216] While at least the 2010 (and 2018) NPRs were published, the 1994 and 2002 NPR editions were either not available at all or published in non-classified excerpts only.

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on the ratification of the 1993 START II Treaty, which included the elimination of the MIRV capability for missiles.[1217] The second one could be extracted from the 2019 Speech by NATO Deputy Secretary General Rose Gottemoeller at the University of Oslo, where she said that:

> "[The U.S] faced this problem from the outset of strategic arms negotiations with the **Soviet Union**, because always, always they had a **predominant ICBM force**, much more capability in their ICBM force than the **United States** had, because we chose to **focus more on our At Sea Deterrent and to put more warheads on our submarines**. So there was always that issue of, you know, a **lack of complete symmetry between the force structures of the two sides in the nuclear arena**." (Gottemoeller)[1218]

Finally, the third indicator is the sea-based nuclear deterrent provided by the Trident II SLBM, which can be armed with up to eight MIRV warheads in a New START-compliant manner and is thus in principle capable of replacing any land-based MIRV ICBM.[1219] Considering these three indicators, it appears that the U.S. has traditionally placed a higher value on SLBMs from its nuclear triad on the one hand, and NATO appeared to fully agree with the reliance of NATO's nuclear deterrence on U.S. strategic submarines.

The maritime domain of the nuclear triad should therefore receive particular attention for the nuclear deterrent capability analysis. After the 1994 NPR[1220] the U.S. had decided for the first and only time to reduce the quantity of Ohio-class submarines used within the remit of the nuclear triad from 18 to 14 (these four were not deactivated but refitted for conventional cruise missile attacks). Since then, the sea-based part of the triad has been kept stable. Only from 2020 onwards does the U.S. plan a further reduction in the transfer of deterrence tasks from the 14 Ohio-class submarines to 12 Colombia-class submarines from 2030 onwards. Despite the planned reduction in the quantity of the future platforms for sea-based deterrence, the U.S. has considered any further decreases (e.g., from 12 to eight submarines) as detrimental to the U.S. deterrence posture and subsequently to the extended deterrence to its allies.[1221] In this sense,

[1217] See paragraph 35 in: NATO (1997): Final Communiqué, Meeting of the North Atlantic Council in Defence Ministers Session held in Brussels, 2. February 1997, Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_25442.htm?selectedLocale=en (Last visit: 06.01.2022).
[1218] NATO (2019): NATO Nuclear Policy in a Post-INF World, Speech by NATO Deputy Secretary General Rose Gottemoeller at the University of Oslo, Hyperlink: https://www.nato.int/cps/en/natohq/opinions_168602.htm?selectedLocale=en (Last visit: 06.01.2022).
[1219] Missile Threat (2021): Trident D5, Hyperlink: https://missilethreat.csis.org/missile/trident/ (Last visit: 27.12.2022).
[1220] Military.com (n.a.): SSGN - Ohio Class Guided Missile Submarine, Hyperlink: https://www.military.com/equipment/ssgn-ohio-class-guided-missile-submarine (Last visit: 06.01.2022).
[1221] US Department of Defense (2020): Factsheet: The Importance of Modernising the Nuclear Triad, p. 3, Hyperlink: https://media.defense.gov/2020/Nov/24/2002541293/-1/-1/1/FACTSHEET-THE-IMPORTANCE-OF-MODERNIZING-THE-NUCLEAR-TRIAD.PDF (Last visit: 05.01.2022).

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the U.S. could ensure that U.S. sea-based deterrence remains a central component of NATO's nuclear deterrence and defence[1222] in the foreseeable future.

In the air domain, the B-52, B-2, as well as the B-1 (removed from the strategic deterrent after 2007) had seen most combat action throughout the post-Cold War era, however, in a conventional role in the various conflicts in the Balkans and Middle East.[1223] While the number of B-2 had remained stable, the much older B-52 had been practically reduced to half of the early post-Cold War planning. Given the modernisation of the B-52 has been announced in 2022[1224], the value of the U.S. Air Forces B-2 replacement can be considered very high for the overall U.S. nuclear and conventional operations planning. Thus, NATO might most likely be able to rely on the air-leg of the U.S. nuclear triad.[1225]

Summarising the capability perspective on the U.S. nuclear triad and its subsequent implications for NATO, the U.S. nuclear capabilities decreased by an irregular rate throughout the post-Cold War era. The reductions from the earlier post-Cold War time as well as around 2010 can be explained by the influence of the different START treaties as an expression of a mutually agreed cooperative security framework between the U.S. and Russia. The quantities in all three legs of the nuclear triad were still retained at a level that commensurate U.S. (and subsequently NATO) demands for having enough nuclear weapons at its disposal to deter any nuclear-armed state (including Russia). **Derived from the analysis of the U.S.' comprehensive nuclear arsenal which consists of a full strategic nuclear with respective delivery systems and the continuous commitment by the U.S. to provide a nuclear 'umbrella' for the transatlantic alliance[1226], the U.S. extended nuclear deterrence to NATO is herewith defined as 'credible' throughout the period of examination.**

[1222] For completeness, it should be noted that UK (and potentially France, which is not part of NATO's Nuclear Planning Group) further ameliorate NATO's nuclear deterrence and defence posture in general and the sea-based nuclear deterrence in particular. See: Granholm, N./Rydqvist, J. (2018): Nuclear weapons in Europe: British and French deterrence forces, pp. 21-24 and pp. 50-56, Hyperlink: https://www.foi.se/rest-api/report/FOI-R--4587--SE (Last visit: 07.01.2022).

[1223] See further details in the entries of each aircraft under: US Air Force (2019): B-52H Stratofortress, Hyperlink: https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104465/b-52h-stratofortress/ (Last visit: 08.12.2022); US Air Force (2015): B-2 Spirit, Hyperlink: https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104482/b-2-spirit/ (Last visit: 06.01.2022); and: US Air Force (2016): B-1B Lancer, Hyperlink: https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104500/b-1b-lancer/ (Last visit: 06.01.2022).

[1224] Breaking Defense (2022): With new radar and engines in sight, the B-52 gets ready for 'largest modification in its history', Hyperlink: https://breakingdefense.com/2022/08/with-new-radar-and-engines-in-sight-the-b-52-gets-ready-for-largest-modification-in-its-history/ (Last visit: 06.01.2022).

[1225] US Department of Defense (2022): World Gets First Look at B-21 Raider, DoD News, Hyperlink: https://www.defense.gov/News/News-Stories/Article/Article/3235326/world-gets-first-look-at-b-21-raider/ (Last visit: 06.01.2022).

[1226] Paragraph 54 in: NATO (1991): The Alliance's New Strategic Concept (1991), Hyperlink: https://www.nato.int/cps/en/natohq/official_texts_23847.htm (Last visit: 26.11.2022); paragraph 62 in: NATO (1999): The Alliance's Strategic Concept (1999). Hyperlink:

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4.5.4 Interim conclusion: U.S. extended nuclear deterrence posture

The central aim of subchapter 4.5 was the comprehensive game-oriented analysis of the U.S. (extended) strategic nuclear deterrence in three period of examination (see below). For this endeavour, subchapter 4.5.2 focussed on the credibility of the U.S. nuclear deterrence in accordance with the qualitative methodology of subchapter 4.1.1.2, while subchapter 4.5.3 provided an overview on Russia's posture in regard to its key military capabilities examined in line with qualitative methodology of subchapter 4.1.1.2.

Recalling the results from the credibility-related analysis from subchapter 4.5.2,

(7) The 1994 Nuclear Posture Review in the military context of the 1993 Bottom-Up Review and the political overall framework of the 1991 National Security Strategy for initial post-Cold War era (1992) was identified as '**soft**'

(8) The the 2002 Nuclear Posture Review in the military context of the 2002 Quadrennial Defense Review and the political overall framework of the 2002 National Security Strategy after the first decade of the post-Cold War era (2001) has been '**hard**', and

(9) The 2010 Nuclear Posture Review in the context of the specialised 2010 BMD Review, the general military context of the 2010 Quadrennial Defense Review, and the political overall framework of the 2010 National Security Strategy after the second decade of the post-Cold War era (2010) was determined to be '**hard**'.

The individual results of each of the four indicators in line with Table 59 from subchapter 4.4.2.1 are displayed in Table 84 below:

	Initial post-Cold War era (1992)	*After the first decade of the post-Cold War era (2001)*	*After the second decade of the post-Cold War era (2010)*
1. Indicator	Soft	Hard	Soft
2. Indicator	Soft	Hard	Hard
3. Indicator	Soft	Soft	Hard
4. Indicator	Soft	Hard	Hard

Table 92: Overview of the U.S. (extended) strategic nuclear deterrence posture from the subchapters 4.5.2.2, 4.5.2.3, and 4.5.2.4 [own description]

In line with subchapter 4.5.3.5 regarding the development of the U.S. strategic nuclear deterrent in the post-Cold War era, it is a priori assumed that in view of the comprehensive nuclear triad that the U.S. maintained throughout the period of examination is principally 'capable'.

https://www.nato.int/cps/en/natohq/official_texts_27433.htm?mode=pressrelease (Last visit: 23.11.2022); and paragraph 18 in: NATO (2010): Strategic Concept 2010: 'Active Engagement, Modern Defence', pp. 14, Hyperlink: https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf (Last visit: 03.12.2022).

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Following the empirical analysis of the U.S. as the nuclear-armed defender in the integrated conventional/nuclear deterrence game, the third of the three hypotheses can now be tested.
Recalling the specific hypothesis from subchapter 4.1 below:

> **Hypothesis 3**: The nuclear-armed defender who is the decisive guarantor of the extended nuclear deterrence inside the military alliance decreases his nuclear commitment to the military alliance in terms of credibility and capability.

Response: The hypothesis cannot be confirmed for the credibility of the U.S. extended nuclear deterrence and it cannot be confirmed for the capabilities of the U.S. strategic nuclear deterrent.

Justification: The hypothesis must be invalidated for several reasons. In regard to the credibility of the U.S. extended nuclear deterrence for NATO, the transatlantic alliance mutually and repeatedly emphasized NATO remains a nuclear alliance with the U.S. as the supreme guarantor of the alliance's strategic nuclear deterrence while France and the UK contribute through their independent nuclear deterrence. It is true that, NATO emphasized at the same time that it foresees the reduction and further limitation of the role of nuclear weapons for the Alliance (e.g., no nuclear contingency planning).
Furthermore, for the initial post-Cold War era (Year: ~1992), it is also true that extensive disarmament efforts by the Clinton administration. At that time, the nuclear capability potential of the USA was still extensive but declining due to the mutual disarmament treaties between the U.S. and Russia (see Chapter 4.2.3).
After end of the first decade of the post-Cold War era (Year: ~2001), the W. Bush government issued an ambitious concept of a "new triad" that was designed to deter and defeat exogenous threats, such as "rogue states". This did not mean a massive expansion of the U.S. nuclear potential, but the expansion of a conventional long-range attack capacity together with the expansion of conventional ballistic missile defence. In this respect, the U.S. two aspects: (1) The importance of nuclear deterrence remains, but has been supplemented by a potentially more valuable actual operational capability, and (2) The U.S. continues to strive for a reduction in nuclear weapons worldwide, aware that this disarmament threatens its massive conventional capabilities less than a power like Russia, which has relied heavily on nuclear weapons since the 1992 due to a lack of capabilities (see Chapter 4.6).
Despite the rhetoric of the Obama administration at the 2009 Prague speech at the end of the second decade of the post-Cold War era (Year: ~2010), the U.S. stance continued to be hard, however softer in tone than under W. Bush. In regard follow-on treaties of the 2010 New START Treaty, the position of the Obama administration to pursue further nuclear disarmament

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represents a two-edged sword for the Kremlin, who relied much stronger on nuclear weapons than the conventionally superior U.S. Through further nuclear disarmament and further proliferation of BMD system, *inter alia* from the U.S. to NATO, the U.S. was attempting no less than a shift in the strategic balance between the U.S. and Russia in the Euro-Atlantic region from a Russian perspective. On the basis of these considerations, the Hypothesis 3 cannot be validated.

4.6 Conclusion of the empirical case study on NATO's deterrence and defence posture in the post-Cold War era

The central aim of the empirical Chapter 4 was the validation of the game-theoretic framework formulated in subchapter 3.5. In order to translate the theory into an operative analytical instrument usable for examining qualitative and quantitative data, an operationalisation was provided in subchapter 4.1.2. The theoretic background for the operational criteria was derived from subchapter 3.2 and 3.6, namely the reference to credibility and capability as key elements of PDT game-theoretic designs.

Based on the basic game structure as shown in subchapter 3.5, subchapters 4.3, 4.4., and 4.5 were designed in a symmetrical pattern. Each of these subchapters belongs to one player, beginning with Russa as challenger (4.3), followed by NATO as 'collective' of the protégé plus conventional defender (4.4.), and ends with the U.S. in its nuclear-armed defender's role (4.5.). At the next lower level of the chapter structure, subchapters 4.3.2, 4.4.2, and 4.5.2 focussed on the analysis of the credibility of each player. In line with the key high-level strategic documents (see Table 19) and on the basis of the qualitative method of text analysis displayed in subchapter 4.1.2.1, the following period of examination was scrutinised

(1) The initial post-Cold War era,
(2) After the first decade of the post-Cold War era1st decade,
(3) After the second decade of the post-Cold War era1st decade.

Each of these points in time were analysed regarding operationalised player-specific criteria presented in the Tables 20, 21, 22 and subsequently evaluated as either 'hard', 'soft' or 'inconclusive'.

In line with operationalisation from subchapter 4.1.2 and the theoretical basis of subchapter 3.2, the second key factor – military capability – were added to the analysis. Mirroring the symmetric approach from the credibility analysis, the conventional capabilities of Russia (4.3.3) and NATO (4.4.4) were examined on the basis of the rDMC dataset and the

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methodological approach of using ratios (see subchapter 4.1.2.2) between Russia-to-NATO (total) and Russia-to-NATO-Europe provided comprehensive results for the conventional deterrence domain.[1227] In regard to nuclear deterrence, each player was awarded an additional 'capable' because of the special characteristics of these weapons of mass destruction and the large nuclear triads of both Russia and the U.S. In addition, and in deviation from the theoretic approach, NATO has also been awarded a 'capable' as explained in subchapter 4.3.3.6.
It is important to understand that such numbers are quantitative aggregates without political considerations. Therefore, the Global Firepower alternative dataset has set an exemplary commitment level because not all NATO-member states might contribute all their forces to a certain conflict. In the scope of the analysis above, such considerations were omitted because national commitments to NATO as part of a general deterrence posture are difficult to operationalise and highly hypothetical. Afterall, it is a political decision at the highest levels of each NATO member state when and where national armed forces are to be deployed.

The essence of the comprehensive analysis of the credibility and capability of each player in the integrated conventional/nuclear deterrence game is presented in Table 93 below:

		Initial post-Cold War era (1992)	*After the first decade of the post-Cold War era (2001)*	*After the second decade of the post-Cold War era (2010)*
Russia	Threat Posture - Credibility	Soft	Inconclusive	Hard
NATO	NATO's Deterrence and Defence Posture – Capability - Credibility	Inconclusive	Soft	Inconclusive
U.S.	U.S. (extended) nuclear deterrence posture – Credibility	Soft	Hard	Hard
Russia	Threat Posture – Capability against NATO	Capable (4)	Capable (2) Partially Capable (1)	Capable (3) Partially Capable (1)
	Threat Posture – Capability against NATO-Europe	Capable (10) Partially Capable (1)	Capable (7) Partially Capable (1)	Capable (6)
NATO	NATO's Deterrence and Defence Posture – Capability against Russia	Capable (13)	Capable (14)	Capable (14)

[1227] For a comprehensive overview on the ratio counts per player per domain in capable/partially capable/incapable/NA [Not available] is provided under No. VII in the Appendices.

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NATO-Europe	NATO-Europe's Deterrence and Defence Posture – Capability against Russia	Capable (8) Partially Capable (1)	Capable (10) Partially Capable (1)	Capable (11)

Table 93: The solution of the integrated conventional/nuclear deterrence game between Russia (challenger), NATO ('collective' protégé plus conventional defender), and the U.S. (defender) [own presentation]

Based on the combined results from the empirical analysis of Russia's threat posture, NATO's deterrence and defence posture, and the U.S. extended nuclear deterrence, the combination of their individual postures at the specific period under examination are 'filled' into the integrated conventional/nuclear deterrence game as described in subchapter 3.5.

Subsequently, equilibria from the Table 17 and Table 18 from subchapter 3.6 can be applied, which map the decision of each player at the last node of the integrated conventional/nuclear deterrence game.

The main component of the posture per player is represented by the outcome of its credibility analysis. The capability dimension is used for determining the outcome of a game by applying logic. A player that lacks capabilities (i.e., compare the double-digit 'capable' count of capabilities for NATO vis-à-vis Russia), he cannot pose a capable threat.

Furthermore, and as explained in subchapter 3.6, the inconclusiveness of a player's posture is further examined by simply identifying the game result on the basis as if he is hard and furthermore as if he is soft. Furthermore, for the following scenarios it applies:

- When the challenger or protégé are inconclusive, both hard and soft positions are tested.
- In such cases, the capability dimension is used as a 'tiebreaker' to identify which of the solutions is more likely. The more likely outcome is marked in '**bold**'.

		Initial post-Cold War era (1992)	*After the first decade of the post-Cold War era (2001)*	*After the second decade of the post-Cold War era (2010)*
Russia	Threat Posture - Credibility	Soft	Inconclusive	Hard
NATO	NATO's Deterrence and Defence Posture – Capability - Credibility	Inconclusive	Soft	Inconclusive
U.S.	U.S. (extended) nuclear deterrence posture – Credibility	Soft	Hard	Hard

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Equilibria	Threat posture towards the Defender	**Steadfast deterrence** *or* Bluff deterrence	**Steadfast deterrence**	**Steadfast deterrence** *or* Separating deterrence
	Threat posture towards the Protégé	Separating deterrence *or* **Bluff deterrence**	**Separating deterrence**	**Separating deterrence**

Table 94: Equilibria integrated conventional/nuclear deterrence game between Russia (challenger), NATO ('collective' protégé plus conventional defender), and the U.S. (defender) [own presentation]

Based on the information from Table 93, the integrated conventional/nuclear deterrence game between Russia, NATO and the U.S. ends with a combination of equilibria ranging from 'Bluff deterrence' over 'Separating deterrence' to 'Steadfast deterrence' over the period of examination.

In the initial post-Cold War era, Russia was clearly not willing to pose a robust threat posture vis-à-vis NATO and the U.S. The reasons for such policy by the Kremlin are manifold and the most relevant considerations were the efforts in U.S.-Russia nuclear disarmament, general retreat by the Russian armed forces from Eastern Europe back to Russia, military reform following the end of the Soviet Union's Red Army, and more. Principally, Russia could have posed a threat to NATO-Europe since it was still superior to any single country in Europe and without any external support (especially from the U.S.), the posture of NATO-Europe at the time was merely a bluff. In contrast, the U.S. was more robust in its deterrence and would have had a considerable advantage in conventional and nuclear capabilities even if the NATO allies in Europe would be hesitant to resist.

After the first decade of the post-Cold War era, Russia behaved inconclusively in regard to its threat posture. The Kremlin under the new President Putin had continuously stressed his national security interests in Eastern Europe that was threatened to a certain extent by NATO's Eastern enlargement. Nevertheless, Russia did not pose clear threat posture in that period of time. A decade of neglect of Russia's armed forces – less in regard to the strategic nuclear forces but more to the conventional branches – by his predecessor Yeltsin left the new Russian administration with a lot of work regarding the modernisation of its armed forces. Meanwhile, Europe was undergoing massive force reductions after the end of the Cold War, however, additional NATO members as well as the parallel weakness of Russia's military helped to stabilise NATO-Europe's conventional deterrence to a higher level (under the condition that the strategic nuclear deterrent was still provided by the U.S.). In comparison, the U.S. remained stable in its deterrence towards Russia in the time of the W. Bush administration.

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After the second decade of the post-Cold War era, Russia became definitely more determined after the first period of Putin's regency. After militarily consolidating Russia through the long Second Chechen War and the lessons learned from 2008 Russo-Georgian War, Russia made considerable steps in improving its armed forces. At the same time, NATO-Europe had increasingly grown in its size after two rounds of enlargement in 1999 (plus three new members), 2004 (plus seven new members), and 2009 (plus two new members). While the military capabilities of the NATO enlargements of 2004 and especially of 2009 were not that large, it still retained a large stockpile of conventional weapons according to the rDMC dataset. In view of the subject of this dissertation, namely NATO's deterrence and defence posture, as well as the difficult politico-military context of three players (Russia, NATO, the U.S.) and given the long period of time that is examined in this analysis (1992-2016 with the central focus on the initial post-Cold War era (1992), the end of the first decade of the post-Cold War (2001), and the end of the second decade of the post-Cold War (2010), the 'empirical weight' upon the game-theoretic framework as designed in subchapter 3.5 was immense.

Nevertheless, after a thorough empirical analysis followed the completion of the game and the game results from Table 93 and Table 94 have proven the validity of the integrated conventional/nuclear deterrence game concept.

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Chapter 5: Final conclusion and outlook

The central aim of this dissertation was the answer the research question as introduced in subchapter 1.3. The research question is herewith recalled as per below:

How did NATO's deterrence and defence posture evolve in the post-Cold War era in regard to its effect on deterring the militarily most potent third state in the Euro-Atlantic region, Russia?

With this question in mind, Chapter 2 gave a comprehensive literature review that was aimed at providing a brief introduction to the conceptual foundations of some follow-on questions such as "What is deterrence? "How does this relate to defence?" or "What role does a military alliance play in this?" come into play.

Furthermore, Chapter 2 provided a comprehensive overview of key research applicable to that research question. The literature review produced the following insights:

The research literature on hard military security and approaches to international deterrence of a conventional and nuclear nature are often outdated. Since the end of the Cold War, the *rationale* for such research and the empirical basis was practically lost due to the disappearance of the bloc confrontation in Europe. Research on military issues and deterrence in the post-Cold War era was increasingly redirected broader concept of security, deterrence of non-state actors, proliferation of weapon systems, etc.

Classical research theories on the basis of rational states as actors, such as neorealism and neo-institutionalism as "grand theories" of international relations have served as a point of reference for many researchers again and again. However, the question of conventional and nuclear deterrence and cooperation within the framework of an alliance cannot be analysed in sufficient detail with these theories.

An alternative research approaches from defence economics make a better contribution in detail, but mostly consider very limited aspects such as the provision of military security by an alliance as a pure/impure public good or the question of the distribution of burdens for joint distribution (e.g., burden-sharing within the framework of the Economic Theory of Alliances), or the arms race, which is not relevant here.

In a nutshell, deterrence theory itself has proven to be the most accessible and practicable theoretical approach. In addition to the classic variant, which is based in particular on the principles of the first researchers in the discipline from the 1950s and 1960s, this also offers a

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more current approach, which is operated by some Anglo-American researchers as the "Perfect Deterrence Theory" (PDT).

In regard to the research gap, following elements have been discovered:

Basic research: The question of a new or re-development of a neglected research ara (conventional and nuclear deterrence) on the basis of new theoretical approaches and methods is required in view to politico-military changes since the 2022 Russian attack on Ukraine.

Case study contribution: The question of the credibility and capability of NATO's deterrence and defence posture from an empirical perspective for the years 1992-2016 can be answered using the theoretical approach.

Operationalisation: Previous PDT models were tested either on the basis of quantitative analyses or based on case studies. Currently, no case studies cover the field of this dissertation's interest. In this respect, an additional research contribution to the transfer from PDT to practical application is another research gap.

The central aim of Chapter 3 was the creation of the game-theoretic framework as the theoretical foundation of the empirical analysis of Chapter 4. The actual execution of the game itself is based on established assumption from PDT.

As a starting point, the core elements of the PDT (credibility, capability and rationality) were presented comprehensively in subchapter 3.2. Then, the structural game parameters were defined in subchapter 3.3 based on an outline of the different elements of an extended, general, unilateral, conventional, and nuclear deterrence game.

In subchapter 3.5, the core game-theoretic contribution of this dissertation – the integrated conventional/nuclear deterrence game – was developed on the basis of Quackenbush's three-player model with a challenger, a protégé and a defender and with a nuclear option for the challenger and defender due to their nuclear arsenals. The integrated conventional/nuclear deterrent game was further expanded by minor modifications in subchapter 3.5.1 and 3.5.2, thereby adding some limited dynamics in the policy strategies of the players in the game. These dynamics come from the inclusion of political-military doctrines that play a central role key instruments/document for the credibility or capability of the respective player. Furthermore, new developments in military technology (ballistic missile defence) can also affect the game in terms of the credibility or capability of the players (e.g., in the question of strategic (nuclear) balance). Due to the complexity of the integrated conventional/nuclear deterrent game (Quackenbush's pure conventional game already identifies 14 equilibrium states), subchapter 3.6 provides simplified approach. Assuming the game has arrived at a juncture after the opening of the challenge, players identify their respective game strategies (hard, soft, inconclusive) in

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the context of a general game of deterrence. The combination of these postures is evaluated along a simplified form of the five most common equilibrium states used in the PDT.

Summarising a simple round of the integrated conventional/nuclear deterrence game:

The unilateral deterrence game always begins with a threat from the challenger, since he wants to change the status quo. The Defender and protégé, on the other hand, are satisfied with the status quo. After the challenge has been issued, the challenger must choose whom to challenge (either defender or protégé). This is the 1st node in the sequential game.

The challenged player then takes action and decides whether to give in or resist. If the challenged player is the defender, he may choose nuclear escalation as alternative to giving in or resisting.

If the active player gives in on the node, then the game ends and all players receive their pay-off. If the active player resists, their allied player comes (depending on who was active at the 1st node: defender or protégé). This may decide whether he supports his alliance partner (reliable) or not (unreliable). If he does not assist, the game ends with a pay-off. If, on the other hand, he supports the alliance partner, the challenger can now decide whether he gives in or resists due to the alliance's fortitude (these strategies also end the game) or whether the challenger escalates himself. Whenever a defender or challenger decides to escalate, the three-player game becomes a two-player game. The challenged player then has only the choice of either resisting or giving in.

Important note in the context of the setup: The designations such as Challenger and Defender or the end results such as Retreat or Multilateral or Nuclear War were chosen generically to indicate the end of the game. In the context of a general game of deterrence, the end of the game means the beginning of a game of direct deterrence, as the challenger may feel able to use concrete efforts to adjust the status quo.

Recalling the key indicators from PDT, it was said that only a credible deterrence and defence posture can deter a challenger from issuing a threat. Under the condition of incomplete information and in a general deterrence setting, it is vital for the military alliance to signal the credibility of the alliance’s deterrence and defence posture towards any challenger. In addition, it is also critical for the nuclear-armed defence to provide insight into his extended nuclear deterrence for both the allies that he protects as well as the third state that he attempts to deter from initiating an immediate deterrence. On the other side, the challenger is also interested in promoting his position particularly regarding any politico-military ‘red lines’ that the other two players are not supposed to cross when they do not want to get into trouble with the challenger.

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This signalling by all players can be performed through various methods. For a game-theoretic analysis, the most direct and easiest approach was to examine publicly disseminated documents that are of high value in the publishing state's/alliance's official policies. A total of nine documents – three documents per player – were identified and compiled as high-level strategic documents in Table 19 of subchapter 4.1.2.1.

Based on the temporal distribution of the documents, a period of examination in the post-Cold War era could be identified that contained three approximated which were taken as the following junction points:

(4) The initial post-Cold War era (year: ~1992),

(5) After the first decade of the post-Cold War era1st decade (year: ~2001), and

(6) After the second decade of the post-Cold War era1st decade (year: ~2010).

Taking into account that the focus of this dissertation was put on deterrence and defence, it is, nevertheless, necessary to give due consideration to the politico-military context of the period under examination. In the post-Cold War era, cooperative security arrangements have played an important part for conventional as well as nuclear disarmament and were responsible to considerable downshifts in national military capabilities in the Euro-Atlantic region. When capability-related analyses are to be conducted in the scope of a contemporary timeframe (e.g., post-Cold War era), the impact of such cooperative security frameworks on military capabilities must be taken into account, otherwise one might gain only an incomplete image of the reality. Subchapter 4.2 was intended to provide insights into a number of selected treaties that affect quantitative (and partially qualitative) levels of conventional and nuclear arsenals of Russia as well as NATO since the beginning of the transition period from the Cold War to the post-Cold War era (~1990-1992). Furthermore, the cooperative security framework between NATO and Russia, namely the 1997 NATO-Russia Founding Act, was also mentioned in subchapter 4.2 due to its political relevance for both sides in their relationship.

Subchapters 4.3, 4.4, and 4.5 were principally designed to reflect the structure of the game-theoretic framework. For each of the player, one hypothesis has been formulated in subchapter 4.1.1. They are hereby briefly recalled with their results:

For Russia (subchapter 4.3): **Hypothesis 1**: The challenger establishes a credible and capable threat posture in order to force the defender and protégé into an immediate deterrence situation through which the challenger hopes to gain the desired change of the *status quo*.

Response: The hypothesis <u>can be confirmed for the credibility</u> of Russia's threat posture, but <u>cannot be confirmed for the capabilities</u> of Russia's military forces.

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For NATO (subchapter 4.4): **Hypothesis 2**: The military alliance consisting of a protégé and conventional side of the defender decrease the military alliance's deterrence and defence posture in terms of credibility and capability to a minimum that corresponds alliance's agreed minimum military security requirement.

Response: The hypothesis can be confirmed for the credibility of NATO's deterrence and defence posture, but cannot be confirmed for the capabilities of NATO's military capabilities.

For the U.S. (subchapter 4.5):

> **Hypothesis 3**: The nuclear-armed defender who is the decisive guarantor of the extended nuclear deterrence inside the military alliance decreases his nuclear commitment to the military alliance in terms of credibility and capability.

Response: The hypothesis cannot be confirmed for the credibility of the U.S. extended nuclear deterrence and it cannot be confirmed for the capabilities of the U.S. strategic nuclear deterrent.

Subsuming the results of the hypotheses testing in order to answer the research question, Russia's threat posture following the end of the Cold War has considerably suffered from neglect through the 1990s and was just to begin to reappear in the 2010s years.

NATO's deterrence and defence posture was adapted to the post-Cold War era since the 1990s and throughout the 2010s. The basic 'turn' back towards territorial deterrence, thus, was just re-established in 2022 due to Russian invasion in Ukraine.

In regard to the U.S. extended nuclear deterrent, since the W. Bush government's introduction of a New Triad in 2002, the U.S. extended nuclear deterrence posture began to become more robust. However, this was not due to the nuclear deterrent, but through the introduction of ballistic missile defence system capabilities as well as conventional long-range strike missile capabilities.

With a view to future, it is expected that Russia continues on the track of a hard threat posture, while NATO, together with the U.S., attempts to follow on by strengthening and reforming its NATO deterrence and defence posture in order to provide a credible and capable conventional and nuclear deterrence for the reassurance of its member states on the quest for military security.

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Appendices

I. Three-player extended deterrence base game model with incomplete information

	Strategic Variables										
	Challenger		Defender				Protégé				
Equilibrium	u	v	X_R	X_U	Y_R	Y_U	W_R	W_U	Z_R	Z_U	*Existence Conditions*
Det_1	0	0	1	1	1	0	1	1	1	0	$p_{Def} \geq g_u$ and $p_{Pro} \geq d_u$
Det_2	0	0	1	0	1	0	1	1	1	0	$p_{Def} \geq c_1$, $p_{Def} \geq g_u$, and $d_r \leq p_{Pro} \leq d_u$
Det_3	0	0	1	1	1	0	1	0	1	0	$p_{Pro} \geq c_2$, $p_{Pro} \geq d_u$, and $g_r \leq p_{Def} \leq g_u$
Det_4	0	0	1	0	1	0	1	0	1	0	$g_r \leq c_1 \leq p_{Def} \leq g_u$ and $d_r \leq c_2 \leq p_{Pro} \leq d_u$
DAE_1	0	1	0	0	1	0	1	1	1	0	$p_{Def} \geq g_u$ and $p_{Pro} \leq d_r$
DAE_2	0	1	0	0	1	0	1	0	1	0	$g_r \leq p_{Def} \leq g_u$ and $p_{Pro} \leq d_r$
DAE_3	0	1	0	0	1	0	0	0	1	0	$p_{Def} \leq g_u$ and $p_{Pro} \leq d_r$
DAE_4	0	1	1	0	1	0	1	1	1	0	$p_{Def} \leq c_1$, $p_{Def} \geq g_u$, and $d_r \leq p_{Pro} \leq d_u$
DAE_5	0	1	1	0	1	0	1	0	1	0	$g_r \leq p_{Def} \leq g_u$, $p_{Def} \leq c_1$, and $d_r \leq p_{Pro} \leq d_u$
DAE_6	0	1	1	0	1	0	0	0	1	0	$p_{Def} \leq c_3$, $p_{Def} \leq g_r$, and $d_r \leq p_{Pro} \leq d_u$
PAE_1	1	0	1	1	1	0	0	0	1	0	$p_{Pro} \geq d_r$ and $p_{Def} \leq g_r$
PAE_2	1	0	1	0	1	0	0	0	1	0	$p_{Pro} \geq c_3$, $p_{Def} \leq g_r$, and $d_r \leq p_{Pro} \leq d_u$
PAE_3	1	0	1	1	1	0	1	0	1	0	$p_{Pro} \leq c_2$, $p_{Pro} \geq d_u$, and $g_r \leq p_{Def} \leq g_u$
PAE_4	1	0	1	0	1	0	1	0	1	0	$g_r \leq c_1 \leq p_{Def} \leq g_u$, $p_{Pro} \leq c_2$, and $d_r \leq p_{Pro} \leq d_u$

Table 95: Perfect Bayesian Equilibrium (PBE) – Set of 14 equilibria solutions[1228]

[1228] Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 574.

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Definition of the existence conditions[1229]:

(1) For protégé:

$$g_u = \frac{g_{BP} - g_{PC}}{g_{BP} - g_{MW-}} \qquad g_r = \frac{g_{BP} - g_{PC}}{g_{BP} - g_{MW+}}$$

(2) For defender:

$$d_u = \frac{d_{BD} - d_{DC}}{d_{BD} - d_{MW-}} \qquad d_r = \frac{d_{BD} - d_{DC}}{d_{BD} - d_{MW+}}$$

(3) For the hard challenger:

$$c_1 = \frac{c_{DC} - c_{SQ}}{p_{Pro}(c_{BD} - c_{MW+}) + (c_{DC} - c_{BD})} \qquad c_3 = \frac{c_{DC} - c_{PC}}{p_{Pro}(c_{BD} - c_{MW+}) + (c_{DC} - c_{BD})}$$

$$c_2 = \frac{c_{PC} - c_{SQ}}{p_{Def}(c_{BP} - c_{MW+}) + (c_{PC} - c_{BP})}$$

when $c_1 > g_u$ and $c_2 > d_u$, or:

$$\frac{c_{DC} - c_{SQ}}{p_{Pro}(c_{BD} - c_{MW+}) + (c_{DC} - c_{BD})} > \frac{g_{BP} - g_{PC}}{g_{BP} - g_{MW-}}$$

$$\frac{c_{PC} - c_{SQ}}{p_{Def}(c_{BP} - c_{MW+}) + (c_{PC} - c_{BP})} > \frac{d_{BD} - d_{DC}}{d_{BD} - d_{MW-}}$$

when $c_1 < g_u$ and $c_2 < d_u$.

II. Enhanced extended deterrence game model with incomplete information

	Strategic Variables				
	Challenger		Defender		
Equilibrium	x_H	x_S	y_H	y_S	*Existence Conditions*
Certain deterrence	0	0	1	unrestricted	$p_{Def} \geq c_t$
Steadfast deterrence	0	0	1	u	$p_{Def} < c_t$

[1229] Quackenbush, S. (2006): Not Only Whether but Whom: Three-Party Extended Deterrence, p. 582.

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Separating Equilibrium	1	0	1	0	$c_s \leq p_{Def} \leq c_t$
Bluff Equilibrium	1	v	1	u	$p_{Def} < c_s$ and $p_{Ch} \leq d_n$
Attack Equilibrium	1	1	1	0	$p_{Def} < c_s$ and $p_{Ch} \geq d_n$

Table 96: Perfect Bayesian Equilibrium (PBE) – Set of five equilibria solutions[1230] under the assumption that the protégé always defies $w_H = w_S = 1$

Definition of the existence conditions[1231]:

$$c_t = \frac{c_{DC} - c_{SQ}}{c_{DC} - c_{DD+}} \qquad c_s = \frac{c_{DC} - c_{SQ}}{c_{DC} - c_{DC}}$$

$$d_n = \frac{d_{CD} - d_{DC}}{d_{CC} - d_{DD-}}$$

III. Doctrinal expansion of the enhanced model: 'Flexible Response' deterrence

Finalising PDT on the basis of the 'Flexible Response' doctrine with a credible conventional and nuclear deterrent, there are a total of four equilibria, whereof two are called Limited Response Deterrence Equilibria (LRDE) and two further Escalatory Limited-Response Equilibria (ELRE).

	Strategic Variables								
	Challenger initiates		Challenger escalates		Defender responds-in-kind		Defender escalates		
Equilibrium	u	v	w_H	w_S	x_H	x_S	y_H	y_S	*Existence conditions*
Form I LRDE	0	0	0	0	1	1	0	0	$p_{Def} \geq c_q$
Form II LRDE	0	0	■	0	1	■	0	0	$c_q \geq p_{Def} \geq c^*$
No-First-Use ELRE	1	1	■	0	1	■	0	0	$p_{Def} \leq c^*$ $and\ p_{Ch} \geq d_p$
Warfighting ELRE	1	■	■	0	■	■	■	0	$c_T \geq p_{Def} \geq c^*$ and $p_{Ch} \leq d_p$

■ $= fixed\ value\ between\ 0\ and\ 1$

Table 97: Perfect Bayesian Equilibrium (PBE) – Set of four equilibria for 'Flexible Response'[1232]

The LRDE variants tend to produce equilibria that favour the *status quo*, but it solely depends on the credibility of the defender. The Form I LRDE represents the best outcome for the

[1230] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, p. 147.
[1231] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 150, 154, 158.
[1232] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 227, 236, 241.

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defender and protégé, since deterrence holds and the challenger never issues a threat against any other player, and if the challenger still does, the defender will always respond-in-kind and the challenger would never escalate in response. Since the challenger issued a threat, the defender believes the challenger to be hard. At the same time, the challenger just observes the defender to defy conventionally, therefore he cannot know the defender's stance, since both hard and soft can behave defiantly. In the Form II LRDE, a hard challenger might initiate a threat or escalate and a soft defender might sometimes concede to an escalation. Nevertheless, the general level of credibility of the defender to react reciprocally is sufficient to deter the challenger.

Under the ELRE variants, there is always a chance for limited war. Nuclear war is possible, if both challenger and defender are hard, while it is most likely avoided when both are soft. Hard defender might escalate first. If the defender has a low credibility and the challenger has a high one, No-First Use ELRE entails that the defender either concedes or defies reciprocally and never escalates. Additionally, the challenger always defects from the *status quo* to start the game, at least choosing limited conflict if soft, and potentially escalation when hard. A Warfighting ELRE occurs, when the defender is not credible enough to deter the challenger from issuing a challenge, while the challenger's threat credibility is relatively lower than the defender's credibility. Both soft and hard challenger are more likely to issue a challenge, but a hard defender might at least defy or even escalate first. Nuclear war can however still be avoided in favour of limited war, if the defender just responds-in-kind and the challenger refrains from escalation.[1233]

IV. Exposed land borders of NATO in Eastern Europe (Russia; Belarus; Ukraine; Moldova)

Duration of NATO exposure to non-NATO Eastern Europe	*State*	*Length*
1992-2016	Norway	191 km (Russia)
1999-2016	Poland	375 km (Belarus) 209 km (Russia (Kaliningrad Oblast)) 498 km (Ukraine)
1999-2016	Hungary	128 km (Ukraine)
2004-2016	Estonia	324 km (Russia)
2004-2016	Latvia	161 km (Belarus) 332 km (Russia)
2004-2016	Lithuania	640 km (Belarus)

[1233] Zagare, F./Kilgour, D. M. (2009): Perfect Deterrence Theory, pp. 234-243.

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		261 km (Russia (Kaliningrad))
2004-2016	Romania	683 km (Moldova) 601 km (Ukraine)
2004-2016	Slovakia	97 km (Ukraine)

Table 98: Exposed land border of NATO in Eastern Europe (South-Eastern Europe/Balkans were excluded)[1234]

V. Military force structure

The military formation structure as displayed below represents a rough 'standardisation' in order to provide the reader some awareness about the approximate size of the post-Cold War era forward presence in comparison to the Cold War forward presence.

Western force model	*Quantity (in soldiers)*	*Russia's force model*	*Quantity (in soldiers)*
Battalion	400-1000	Battalion	250-950
Regiment	2.000-5.000 (around five battalions)	Regiment	900-2000 (three to four battalions)
Brigade	3.000-5.000 (Three to five battalions plus support)	Brigade	2.000-8.000 (intermediate element between regiment and division)
Division	10.000-20.000 (three brigades)	Division	12.000-24.000 (mixture of formations with a dominant arms discipline, such as tank or motorized rifle, plus support)
Corps	20.000-45.000 (Two to five divisions plus specialised brigades and further multi-domain support)	Corps	Two to three motorized rifle (tank) brigades, further corps formations and multi-domain support

Table 99: Approximated comparison of the Western and Russian force models[1235]

VI. Overview of Russia's and NATO's military capabilities

Air domain capabilities:

rDMC Category	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
aircraft_attack	NA	NA	NA	NA	NA	NA	NA	220	220
aircraft_bomber	714	469	1136	720	742	262	1058	263	219
aircraft_fighter	3765	1496	2520	952	908	802	832	648	598
aircraft_transport	660	205	206	123	161	558	462	541	543

[1234] Data derived from the country entries of the CIA World Factbook, see: CIA World Factbook (n.a.): The World Factbook - Countries overview, Hyperlink: https://www.cia.gov/the-world-factbook/countries/ (Last visit: 02.01.2023).

[1235] For the Western force model, see: CFR (2006): Modern Military Force Structures, Hyperlink: https://www.cfr.org/backgrounder/modern-military-force-structures (Last visit: 09.12.2022); and: Inside Thirteen (2018): U.S. Army Units Explained: From Squads to Brigades to Corps, Hyperlink: https://www.thirteen.org/blog-post/u-s-army-units-explained-from-squads-to-brigades-to-corps/ (Last visit: 16.12.2022). For Russia's force model, see: GlobalSecurity (n.a.): Military Units, Hyperlink: https://www.globalsecurity.org/military/world/russia/army-ue-echelons.htm (Last visit: 09.12.2022).

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Table 100: Russia's air domain capabilities 1992-2014, triennially compiled data plus 2014[1236]

rDMC Category	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
aircraft_attack	36	0	0	106	60	40	40	418	380
aircraft_bomber	621	429	382	412	317	335	240	246	245
aircraft_fighter	1931	2176	1585	1607	1416	1282	965	1137	1144
aircraft_transport	2847	2818	2412	2346	2480	1909	1895	2347	2314

Table 101: NATO total air domain capabilities 1992-2014, triennially compiled data plus 2014[1237]

rDMC Category	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
aircraft_attack	16	0	0	106	60	40	40	59	66
aircraft_bomber	79	33	0	0	0	49	0	0	0
aircraft_fighter	1480	1783	1315	1383	1267	1274	952	664	696
aircraft_transport	1066	1122	847	850	934	1064	977	803	822

Table 102: NATO-Europe air domain capabilities 1992-2014, triennially compiled data plus 2014[1238]

Land domain/effects capabilities:

rDMC Category	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
anti-tank/anti-infrastructure_artillery	NA	NA	NA	NA	NA	NA	NA	NA	NA
armoured fighting vehicles_attack	34870	6020	6060	40530	62950	38831	40490	21420	13060
armoured fighting vehicles_transport	11160	4490	4490	15015	13340	13030	13030	17730	11760
land/sea defence_surface to surface artillery	25508	923	1683	19896	26852	24993	26887	6746	6434
land/sea defence_surface to surface missiles	40	NA	316	200	200	200	200	224	236

Table 103: Russia's land domain/effects capabilities 1992-2014, triennially compiled data plus 2014[1239]

rDMC Category	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
anti-tank/anti-infrastructure_artillery	9858	25011	62336	57009	68187	29714	22286	15217	10335
armoured fighting vehicles_attack	50273	37353	35856	40992	43458	38229	35986	25600	24777

[1236] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).
[1237] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).
[1238] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).
[1239] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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armoured fighting vehicles_transport	62885	55699	44824	44807	52141	51203	50037	57305	58143
land/sea defence_surface to surface artillery	37891	32579	25887	29315	32118	29727	27844	22304	22073
land/sea defence_surface to surface missiles	16700	3405	2396	11832	10168	11578	8429	654	680

Table 104: NATO total land domain/effects capabilities 1992-2014, triennially compiled data plus 2014[1240]

rDMC Category	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
anti-tank/anti-infrastructure_artillery	9051	22544	58337	53019	64383	25910	18447	14142	9260
armoured fighting vehicles_attack	26592	16554	19331	24206	26167	22062	21849	16825	16002
armoured fighting vehicles_transport	41977	29027	24287	27224	35166	33089	28627	25123	22966
land/sea defence_surface to surface artillery	24756	21380	17568	20980	23711	22016	19512	14144	14644
land/sea defence_surface to surface missiles	257	144	174	171	280	1690	304	174	200

Table 105: NATO-Europe land domain/effects capabilities 1992-2014, triennially compiled data plus 2014[1241]

Land close air support domain capabilities:

rDMC Category	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
helicopters_attack	1445	1229	1953	1079	889	373	878	378	592
helicopters_transport	1322	1370	70	8	74	758	669	698	686
helicopters_utility	580	200	81	NA	NA	60	70	21	31

Table 106: Russia's land close air support domain capabilities 1992-2014, triennially compiled data plus 2014[1242]

rDMC Category	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
helicopters_attack	4381	3167	3094	2901	2891	2295	1695	1341	1258
helicopters_transport	902	880	540	609	831	1098	1539	5404	5370
helicopters_utility	8058	6593	6044	7066	5858	5444	5037	1913	1922

[1240] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).
[1241] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).
[1242] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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Table 107: NATO total land close air support domain capabilities 1992-2014, triennially compiled data plus 2014[1243]

rDMC Category	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
helicopters_attack	674	1110	1072	988	997	936	461	476	351
helicopters_transport	650	667	421	499	494	507	1101	1922	1878
helicopters_utility	2701	1904	1769	2932	2166	2263	1927	941	914

Table 108: NATO-Europe land close air support domain capabilities 1992-2014, triennially compiled data plus 2014[1244]

Maritime domain capabilities:

rDMC Category	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
principal surface combatants_aircraft carrier	4	2	1	1	1	1	1	1	1
principal surface combatants_cruisers	33	14	17	7	6	9	5	5	5
principal surface combatants_destroyers	26	22	13	17	14	19	9	18	18
principal surface combatants_frigates	129	102	25	45	23	42	27	12	12
submarines_attack	191	137	69	39	67	44	36	46	46

Table 109: Russia's maritime domain capabilities 1992-2014, triennially compiled data plus 2014[1245]

rDMC Category	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*
principal surface combatants_aircraft carrier	16	17	17	17	18	19	17	14	14
principal surface combatants_cruisers	49	33	30	28	28	22	22	22	22
principal surface combatants_destroyers	78	81	103	91	96	91	101	118	113
principal surface combatants_frigates	250	231	222	193	[171]	178	155	142	133
submarines_attack	197	186	151	133	135	137	138	126	127

Table 110: NATO total maritime domain capabilities 1992-2014, triennially compiled data plus 2014[1246]

rDMC Category	*1992*	*1995*	*1998*	*2001*	*2004*	*2007*	*2010*	*2013*	*2014*

[1243] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).
[1244] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).
[1245] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).
[1246] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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principal surface combatants_aircraft carrier	4	5	5	5	6	7	6	3	3
principal surface combatants_cruisers	1	1	1	1	1	0	0	0	0
principal surface combatants_destroyers	29	31	42	33	43	38	42	53	48
principal surface combatants_frigates	156	170	170	146	129	136	113	105	102
submarines_attack	106	101	82	78	77	75	77	64	65

Table 111: NATO-Europe maritime domain capabilities 1992-2014, triennially compiled data plus 2014[1247]

VII Overview of ratio-based posture comparison between Russia, NATO and NATO-Europe

The coding of the overview table is a/b/c/d whereof a is 'capable, b is 'partially capable', c is 'non-capable' and d is 'NA'. The numbers indicate the sum of capabilities belonging to each of the categories, whereas '-' means nil.

Military Capability	*Player*	*Initial post-Cold War era (1992)*	*After the first decade of the post-Cold War era (2001)*	*After the second decade of the post-Cold War era (2010)*
Air domain	Russia	2/-/1/1	1/-/2/1	1/-/2/1
	NATO	1/-/2/1	2/-/1/1	2/-/1/1
	Russia	2/-/1/1	1/-/2/1	1/-/2/1
	NATO-Europe	1/-/2/1	2/-/1/1	2/-/1/1
Land domain/effects	Russia	-/-/4/1	-/1/3/1	1/1/2/1
	NATO	4/-/-/1	4/-/-/1	3/-/1/1
	Russia	2/-/2/1	2/1/1/1	2/-/2/1
	NATO-Europe	2/1/1/1	2/-/2/1	2/-/2/1
Land close air support domain	Russia	1/-/2/-	-/-/2/1	-/-/3/-
	NATO	2/-/1/-	2/-/1/1	3/-/-/-
	Russia	2/-/1/-	2/-/1/1	1/-/2/1
	NATO-Europe	1/-/2/-	1/1/-/1	2/-/1/-
Maritime domain	Russia	-/1/4/-	-/-/5/-	-/-/5/-
	NATO	5/-/-/-	5/-/-/-	5/-/-/-
	Russia	3/1/1/-	1/-/4/-	1/-/4/-
	NATO-Europe	3/-/2/-	4/-/1/-	4/-/1/-
Nuclear domain	Russia	Capable	Capable	Capable
	NATO	Capable	Capable	Capable
	Russia	Capable	Capable	Capable
	NATO-Europe	Capable	Capable	Capable

Table 112: Overview of ratio-based posture comparison derived from the Tables 55 from subchapter 4.3.6, and Tables 85 and 86 from subchapter 4.4.6 [own presentation]

[1247] Gannon, J. A. (2021): Planes, Trains, and Armored Mobiles: Introducing a Dataset of the Global Distribution of Military Capabilities (rDMC), Working Paper. Hyperlink: https://www.militarycapabilities.com/data (Last visit: 06.11.2022).

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