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CONSEQUENCES OF OIL PRICE PLUNGES FOR THE KAZAKH ECONOMY AND POSSIBLE MITIGATION MEASURES

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List of abbreviations

ADB – Asian Development Bank

ADF test – Augmented Dickey Fuller test

ARCH – Autoregressive Conditional Heteroskedasticity

bbl – barrel

bn – billion

CCA – Caucasus and Central Asia

CIS – Commonwealth of Independent States

CITIC – China International Trust Investment Corporation

CNPC – China National Petroleum Corporation

CPI – consumer price index

CU – Customs Union

DEST – development of education, science and technology

EBF – extra-budgetary fund

EBRD – European Bank for Reconstruction and Development

EIA – US Energy Information Administration

EU – European Union

FDI – foreign direct investments

GCC – Gulf cooperation council

GDP – gross domestic product

HSE – health, safety and environment

HSBC - Hongkong and Shanghai Banking Corporation

i.e. – id est

IEA – International Energy Agency

IEF – International Energy Forum

IMF – International Monetary Fund

IEO – International Energy Outlook

JSC – joint stock company

KZT – Kazakhstan tenge (national currency)

OEC – oil-exporting country

OECD – Organisation for Economic Co-operation and Development

OIC – oil-importing country

OPEC – Organization of the Petroleum Exporting Countries

SDDS – IMF's Special Data Dissemination Standard

SME – small and medium entrepreneurship

UAE – United Arab Emirates

UN – United Nations

UNHCR – United Nations High Commissioner for Refugees

US or U.S. – United States

USA – United States of America

USSR – Union of Soviet Socialist Republics

US$ – United States dollar

VAR – Vector autoregression

WTO – World Trade Organization

Introduction

The last oil prices plunge[1], which started in June 2014, affected the world economies seriously. This dissertation addresses the reasons, which resulted in this situation on the world oil market. It then analyzes consequences for oil exporting and importing countries, opportunities and challenges and suggests proactive strategies that will help them to improve the situation prevalent after the sharp fall of crude oil prices of 2014. The world oil prices increased substantially in 2018, however, this increase (as all previous increases and decreases) is temporary as oil prices continue to be volatile. Therefore, this topic and the recommended measures remain important. This work is focusing on Kazakhstan. As additional examples it is also dealing with Azerbaijan as oil-exporting country and Turkey and China as oil-importing countries. Other countries are also considered, but to a lesser extent.

As stated in the Research Plan the objective of the research is the preparation of development scenarios and recommendations for assisting government organizations of Kazakhstan in tackling the consequences of the oil crises. The author is of the view that the preparation of sound econometric models and development scenarios will help to better understand future consequences of oil price plunges for both oil-exporting and oil-importing countries. He is also inclined to believe that these models and scenarios will help in the development of proactive strategies of responding to such crises.

[1] Words “plunge”, “slump” and “negative oil shock” are used interchangeably throughout this document.

1. Literature review

1.1. Consequences of oil price plunges

The influence of oil price plunges, i.e. substantial declines, similar to the ones happened in 1973, 2008 and 2014 on the global economy has long been observed and studied by different authors. The best description was probably made by Yergin (1992). It is also important to mention the seminal work of Hamilton (1983) who pointed out that "All but one of the U.S. recessions since World War II have been preceded, typically with a lag of around three-fourths of a year, by a dramatic increase in the price of crude petroleum". The same was reconfirmed by Brown and Yücel (2002) "rising oil prices preceded eight of the nine post-WWII recessions" (the authors means the recessions in the USA). Ebrahim et al (2014) provided a review of the interactions between global macroeconomic performance and oil price volatility. They recommended policies aimed at mitigating and building resilience to the economic uncertainty advanced by oil price volatility.

The number of scientific publications dedicated to the last oil price plunge and its consequences is relatively small as the new situation emerged in June 2014 only. However they already exist and have been studied thoroughly. They include the works by Baffes et al (2015), who delivered an analysis of the reasons, which led to the last oil price plunge and addressed its macroeconomic, financial and policy consequences. Another analysis was undertaken by Baumeister and Kilian (2016b) who also studied the predictability of oil price plunges. However, the same authors admit that oil price shocks "remain difficult to predict, despite economists' improved understanding of oil markets" Baumeister and Kilian (2016a). An attempt was made "to explore the policy reactions taken in major oil producing countries during these (previous) historical oil price collapses to understand what actions can be taken to navigate the current period of low prices" Luk (2017). In addition to the oil price shock consequences, Schenkkan (2015) also

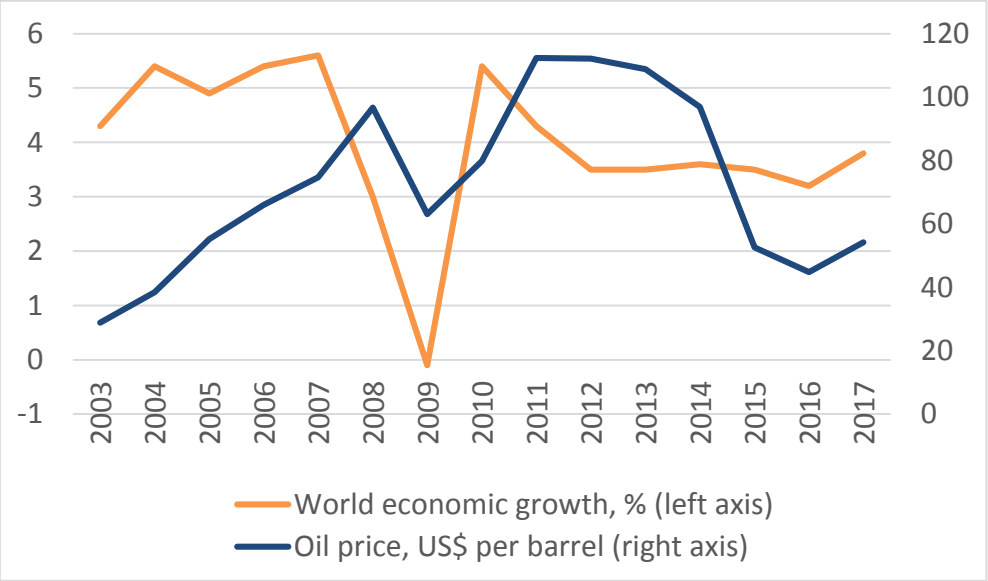
considered the impact of the economic crisis in Russia on Central Asian countries and stated that "Due to its close economic relationship with Russia and its heavy dependency on oil exports (an estimated 69 percent of exports in 2014), Kazakhstan has been the hardest hit in the region". This work further developed upon difficulties of making any predictions pointing out that "What is certain is that the crisis is only in its early stages, and that none of the governments in the region (Central Asian region) have the resources to avoid it. At a minimum, the crisis will cripple public spending and result in more lost years in a region that never recovered from the post-Soviet collapse in infrastructure, social services, and education."

Another attempt to study the situation in the Central Asian and Caucasus was made by Aleksandrova (2016) who pointed out that "The negative impact of oil price prompted CCA (Caucasus and Central Asian) countries to set new priorities for economic development aimed at restructuring their economic and financial systems and improving bank regulations in order to curb the effects of low oil prices and overcome external shocks." and concluded that "The future economic outlook of the oil-exporting counties in the CCA region depends on the advancement and effective implementation of these reforms and policies".

Attention has been paid to the publications of international financial institutions as they are usually very quick in reacting to major global economic developments. One of the first publications on this topic was Husain et al (2015). However, expectations expressed in this document did not materialize. For instance, the document mentions that "The fall in oil prices in the second half of 2014 is expected to result – absent a change in other macroeconomic conditions – in a boost to global economic activity in 2015–16." The same point of view was shared by some researchers like Wang and Li (2016) who emphasized that "declining oil prices would lead to higher economic growth".

This never happened in reality and the same institution IMF later provided contradicting information (see Figure 1 below).

Figure 1. World economic growth and oil price dynamics, 2003-2017



Source: own construction based on IMF and Bloomberg data

Two publications were particularly interesting. A systematic approach to the current economic situation and growth prospects for developing Asia is given by The Asian Development Bank (2017). It is worth mentioning that Kazakhstan as well as other countries considered in this dissertation are the member countries of the Asian Development Bank. The World Bank (2015) analyzed the macroeconomic situation in Kazakhstan after the beginning of the price decline and strongly recommended to focus on attracting foreign direct investments into non-extractive industries. In addition to the usual description of the reasons of the oil price shock and analysis of consequences, Kitous et al (2016), which is a science for policy report by the Joint Research Centre, the European Commission's in-house science service, employed descriptive statistics "to show the exposure of the main oil exporting countries to the oil

price, where GDP and government revenue is found to be closely correlated to the oil price."

Consequences of oil price fluctuations on economies of both oil-exporting and oil-importing countries have been studied by different scientists and the relevant literature can be divided into two main groups.

The first and the biggest part focuses on the influence of oil prices on economic activity of oil-importing countries. The general conclusion of Hamilton (1983), Lee et al (1995), Hamilton (1996), Bernanke et al (1997), Abeysinghe (2001), Jiménez-Rodríguez and Sánchez (2004), Cunado et al (2015) and others is that there is a negative correlation between increases in oil prices and the subsequent economic downturns and vice versa in oil importing countries.

Aside from the substantial amount of publications related to the effect of oil price movements on the economies of developed countries, there is a growing number of publications describing the influence of oil price shocks on developing countries. We can mention the works of Sachs and Warner (2001), Tang et al (2010) and Hou et al (2016). Aastveit et al (2015) noticed that "demand from emerging economies (most notably from Asian countries) is more than twice as important as demand from developed countries in accounting for the fluctuations in the real oil price and in oil production."

The second part of the relevant literature conversely investigates the influence of oil price shocks on oil-exporting countries and finds that generally there is a positive relationship when increases in oil prices are followed by higher economic activity in oil-exporting countries. It is worth mentioning such important works as Jimenez-Rodriguez and Sanchez (2005), Bjornland (2009), Korhonen and Mehrotra (2009), Ftiti et al (2016) and several others who found a positive effect of higher oil prices on the economies of major oil-exporting countries.

Migration has or can become one of the most important consequences of oil price plunges. Kitous et al (2016) assessed a "possible migratory flows due to potential political and economic instabilities in oil exporting countries" (caused by oil price plunges). They conclude that "An economic or political instability induced by low oil export prices is not assumed to be the only exploratory factor driving migrations, but may be an important driver in certain cases."

1.2. Economic diversification

Studying what have been done in this area by other authors, we see that there is a substantial number of examples confirming that in spite of numerous appeals, such efforts in different countries usually fail.

For example, the famous writer and politician Pietri (1936) appealed for diversifying the Venezuelan economy using oil revenues in his famous article "To Sow the Oil" published back in 1936. Unfortunately, nothing has been done so far in terms of diversification of the Venezuelan economy and now the country is facing one of the harshest crisis in its history.

Hvidt (2013) noted that "over the last five decades, the GCC[2] states have taken a number of important steps on the route to diversifying their economies away from dependence on oil and gas… Data shows, however, that the countries remain in a position where the oil sector continues to dominate the economy, and that few of the industries and services established would survive in a post-oil era... Viewed in this manner, the diversification strategy has largely failed."

This opinion is shared widely. Adelaja (2016) mentioned that "For more than a decade, Russia has been attempting to diversify, innovate and modernize its economy, but its efforts thus far have failed to come to fruition."

[2] GCC - Gulf Cooperation Council. Its member states are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

"Nigeria's over dependency on oil has contributed to the poor management of human capital/resources which has led to the migration of many talented citizens of the country to other countries in search of better life. Furthermore, the data show that the neglect of agriculture has, in addition, led to the constant depreciation in GDP of the country" advised Uzonwanne (Uzonwanne, 2015).

Bhaskaran (2007) admitted that "Brunei Darussalam has explicitly stated economic diversification as a major policy objective at least since the Third National Development Plan (covering 1975-1979) although references to the need for economic diversification go back as far as the Second National Development Plan (1962-1966). As part of the planning and conceptualization process for the various efforts at diversification, many studies have been commissioned, all of which have been well formulated with specific projects and recommendations. Yet… these efforts do not seem to have produced the desired results…"

Tombe and Mansell (2016) also addressed this important topic "But does diversification even matter? Economists, for centuries, have found gains from specializing in areas where we have a comparative advantage. Subsidizing certain selected industries therefore risks causing economic damage by distorting activity and displacing workers and investment from more valuable uses. Policy-makers should therefore focus on neutral policies: create a favorable investment climate, facilitate adjustment and re-training, encourage savings (including by government), and so on."

1.3. Possible mitigation measures

Studying what have been done in different oil-exporting countries for overcoming negative consequences of oil price plunges by other authors, we see that this subject generates a big interest among scientists, governments, financial institutions and the general public.

In general, developing countries have found it difficult to use natural resource wealth to improve their economic performance. As stated by Venables (2016) "Utilizing resource endowments is a multistage economic and political problem that requires private investment to discover and extract the resource, fiscal regimes to capture revenue, judicious spending and investment decisions, and policies to manage volatility and mitigate adverse impacts on the rest of the economy."

Very interesting analysis of how the oil price decline affected the OECs was made by Kitous et al (2016) "a 60% price fall, which is a stylized representation of the oil market change over the last two years. The results show that such an oil price drop has different effects across oil exporting countries, unsurprisingly strongly correlated with export dependence to oil. For instance, a 60% fall in the price of oil could lead to a reduction of the GDP of Sub-Saharan Africa by around 8.5%. Russia's negative impact would lie around 4.4% and in Central Asia and Caucasus to 15.2%. Traditional oil producers would also have a substantial negative impact (-14.5% for Saudi Arabia and about -8.6% for Kuwait and the UAE), softened in their case by the substantial size of their reserves per capita, relative low exploitation costs, and large SWFs[3]."

Mathew (2000) pointed out that "At current oil export levels, Iran loses about $1 billion per year in oil export revenues for every $1 drop in oil prices. A serious implication of the decline Iran's oil export revenues has been lack of available cash for much-needed investment in the country's oil sector. As a result, Iran is looking towards Western capital markets as a source of capital investment."

Aleksandrova (2016) noticed that "The CCA (Caucasus and Central Asian) governments of the oil exporting countries developed diverse structural

[3] SWF – sovereign wealth fund

programs consisting of proactive monetary and fiscal adjustment measures aimed at economic recovery. These measures were intended to diversify the countries' economies, deal with the weakened fiscal and external positions, balance consumption and improve the financial situation. Stabilization funds were also used to cover budget deficit and to finance domestic public investments."

Mohn (2016) addressed the matter of resource revenue management in Norway stressing that "The design of the Norwegian model of resource revenue management is motivated by concerns for macroeconomic stability in the short term, and competitiveness, tax and consumption smoothing in the long term."

However, the Norwegian case is very different and cannot be easily replicated in other countries. This is the reason why Eckardt et al (2012) studied the fiscal management of natural resource revenues in a developing country setting advising that "Rule-based fiscal frameworks offer strong benefits to countries that are generating significant government revenue from extractive industries. As commitment devices, these frameworks can reinforce fiscally responsible economic management, contain volatility, and preserve fiscal savings for future generations."

There are different opinions on this topic. An interesting set of possible strategies that oil-exporting countries can follow in the future carbon-constrained world is suggested by Van de Graaf and Verbruggen (2015). They include "quota agreements, price wars, efficiency, compensation, and economic diversification". In any case, the author of this dissertation is of the view that new approaches have to be developed.

A practical approach to oil wealth management in Kazakhstan was presented by Aitzhanova et al (2015). A set of well-balanced and important measures was suggested in this study for the Kazakh government, however, the oil price plunge, which started in June 2014 made the implementation of

these recommendations impossible. Most of the suggested measures look essential up to now. They include the need for the Kazakh government should "adopt a conservative strategy of oil production in order to prolong the sustainability of … oil reserves", "adopt a more stringent discipline in controlling its budget particularly the current expenditures", "consider combing the guaranteed and targeted transfers from the National Fund into a clear and systematic fiscal rule", "provide an explicit public exposure and accountability about the allocation and utilization of targeted transfers from the National Fund", "incorporate a countercyclical component in the annual transfers from the National Fund" and "formation of an Independent Committee of Experts". At the same time, some measures like economic diversification and import substitution look questionable.

1.4. Econometric model

The effect of oil price shocks on macroeconomic indicators has been studied in different scientific literature sources. Even though the developed countries received much more attention, there is growing number of attempts to study the dependence between oil price shocks and macroeconomic performance in developing countries. For instance, Hou et al (2016) investigated the transmission mechanism of oil price shocks in an oil-exporting economy. Cunado et al. (2015) addressed macroeconomic impacts of oil price shocks in Asian economies covering not only such developed countries as Japan and Korea, but also India and Indonesia. Filis and Chatziantoniou (2014) used structural VAR to investigate the financial and monetary policy responses to oil price shocks in several European countries and Russia.

Relevant literature refers to VAR as an optimal model for studying oil-macro relationship in Kazakhstan. The amount of relevant literature is not substantial, but still there are several attempts to explore this subject including the works of Gronwald et al (2009), Kose and Baimaganbetov (2015) and Nurmakhanova (2016).

Kose and Baimaganbetov (2015) studied the "effects of real Brent oil price shocks on the industrial production, real exchange rate and inflation in Kazakhstan are examined by using a SVAR model" for the period from 2000 and 2013 applying structural vector autoregressive model (SVAR). Gronwald et al (2009) assessed the macroeconomic consequences of oil price shocks for the Kazakh economy from 1994 to 2007 applying a standard linear VAR model and Nurmakhanova (2016) used quarterly data from 2000 to 2014 to estimate the Bayesian VAR model. So, none of them examined the influence of the last oil price plunge on the Kazakh economy.

In the analysis of other countries VAR also used widely and different literature sources refer to VAR as to the main instrument in studying the effect of oil price shocks on macroeconomic indicators in different countries. For example, Eltony and Al- Awadi (2001) used a vector autoregression model and a vector error correction model to examine the impact of oil price fluctuations on key macroeconomic variables of Kuwait. Firoozi et al (2016) applied VAR to explore the effects of the uncertainty of oil prices on macroeconomic variables of Iran. Van Robays (2016) used VAR model to obtain results which "show that higher macroeconomic uncertainty, as measured by global industrial production volatility, significantly increases the sensitivity of oil prices to shocks in oil demand and supply. This occurs as uncertainty lowers the price elasticity of oil demand and supply." There are other authors who used VAR for similar purposes including Al-Abri (2013), Ftiti et al (2016) and many others.

2. Objectives of the research. Explanation of the chosen approach

2.1. Objectives of the research

Preparation of economic development scenarios and development of recommendations for assisting government organizations (mostly Kazakh) in tackling the consequences of the oil price plunges.

2.2. Previous researches and sources used

Description of previous researches on this or similar subjects is covered in the Literature review part of this document (above). The amount of researches is relatively small as the new situation emerged in 2014 only. Sources used include, but are not limited to scientific research papers, statistical data of national statistical bureaus and international institutions (World Bank, IMF, ADB, etc.); data and analytics published by consultants and professional associations (IEA, IEF, OPEC, etc.).

2.3. Preliminary research plan

1. Studying the situation. Data collection;
2. Systematization and analysis of collected data;
3. Preparation of development scenarios;
4. Analysis and verification of the development scenarios. Selection of the most likely scenario;
5. Econometric analysis;
6. Preparation of recommendations for assisting government organizations of Kazakhstan in tackling the consequences of the current oil crisis.

2.4. Preliminary conclusions of the research

Even though this chapter was written at the end of 2015 and beginning of 2016 these preliminary conclusions are still valid. Obviously, the situation has changed substantially and spring 2018 witnessed a substantial increase of

oil prices. However, oil prices continue to be volatile and the country has to be prepared to future oil price slumps. So, the results of this dissertation can and will be used in the case of another expected oil price plunge.

- In the mid-term (5-10 years) oil-exporting countries in general and the Republic of Kazakhstan in particular will be facing the period of economic decline (if oil prices would not rise again), which will result in serious cuts of public expenditures, substantial deterioration of living standards and growth of public discontent. It will be the responsibility of national governments to react properly;
- The situation in oil-importing countries in the same period will be substantially better; however the size of economic benefits received through decreased crude oil prices will not directly correlate with the oil prices plunge. The market situation is becoming more complex and the paper addresses and analyses it;
- There is a need to develop new approaches for understanding market drivers and their results. This document is attempting to achieve this goal;
- Recommendations: The current document provides recommendations (below) and is aimed at helping the Kazakhstan national government and the governments of other OECs in responding the crisis.

2.5. Preliminary vision of results to be received through this research

- Theoretical basis for understanding the new situation of energy sector development in Kazakhstan and other oil-exporting countries, its consequences and future developments of the energy market;
- Recommendations for assisting Kazakhstan government organizations in tackling the consequences of the current crisis.

3. Methods used and sources of data

The following methods have been used in this research:

- Econometric analysis
- Expert assessment;
- Scenario analysis;
- Comparative country analysis.

3.1. Approach

The dependence of selected macroeconomic variables on oil price movements are studied using vector autoregressive (VAR) model**,** which is an econometric model used to capture the linear inter-dependencies among multiple time series.

The research also employs the method of scenario analysis. The author is considering 3 oil price scenarios explained below. Probabilities for each scenario are assessed through interviewing 30 oil industry experts.

The time period under consideration is 19 years (14 years prior and 5 years into the future). The statistical data are for the period from 2003 to 2016. The earlier data are not considered because the country joined the International Monetary Fund's Special Data Dissemination Standard (SDDS)[4] in 2003 and to achieve this the country amended some methodologies of data collection and processing. The data for 2017 are not yet available in full.

Sources of data include the Committee on Statistics under the Ministry of National Economy of the Republic of Kazakhstan, the National (Central) Bank of the Republic of Kazakhstan, the World Bank, US Energy Information Administration (EIA), International Energy Agency (IEA), International Monetary Fund (IMF), European Bank for Reconstruction and Development (EBRD), Asian Development Bank (ADB), Bloomberg, Massachusetts Institute of Technology Media Lab, Halyk Finance JSC and several others.

[4] https://www.imf.org/en/News/Articles/2015/09/14/01/49/pr0348

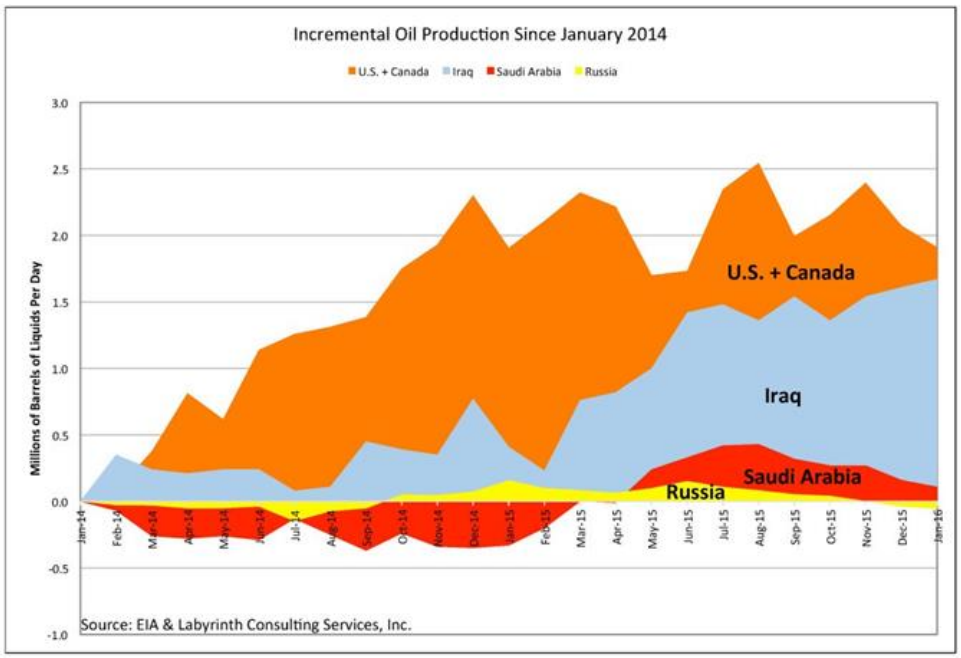
4. Causes of the last oil price plunge

With few exceptions, the last oil price plunge affected the economies of oil-exporting countries in a very negative way. This is why it is important to look into the reasons that led to the last oil price plunge. These reasons may be summarized as follows:

4.1. Influx of Iraq crude oil to the market.

Contribution of the influx of Iraq crude oil is well explained by the chart below.

Figure 2. Incremental oil production since January 2014



4.2. The US is no longer the biggest buyer of crude oil

The US transition from one of the biggest importers of crude oil satisfying only 70 per cent of its energy needs from domestic sources as recently as in 2005 to 90 per cent in 2014 and to lifting its crude export ban at the end of 2015 became one of the biggest contributors to the current situation. As you can see from the chart below, the US crude oil production grew from 7.1 million barrels a day in 2013 to practically 10 million barrels a day in the

first half of 2018, which represent more than 40% increase. This is also an important signal for the market and could be a long-term game changer. Another important point is the psychological effect of this action on the market players.

Figure 3. US Crude Oil Production

4.3. Success of renewable sources of energy

Even though the World now depends heavily on hydrocarbon sources of energy (mainly oil, gas and coal) to meet its energy needs, British Petroleum (2018) informs that "Renewables do, however, play a significant role in the growth of electricity, contributing almost 50% of the growth in global power generation in 2017.

At the individual country level, these sources are already playing an important role in some countries. Denmark leads, with 68% of power coming from renewables. Among the larger EU economies, the renewables share in power is 30% in Germany, 28% in the UK, 25% in Spain, and 23% in Italy.

The rapid growth of renewable power generation continued in 2017, with an increase of 17%. In volume terms, the largest increase in 2016 was in China, followed by the US; with Germany, Japan, and India making up the rest of the top five."

This is happening mainly because of these three reasons:

1. The costs of renewables utilization are coming down rapidly making them more commercially attractive for end users.
2. The utilization of conventional energy sources based on burning fossil fuels has a negative impact on the environment.
3. Another problem with these sources of energy is that they are not renewable. The more they are extracted, the more they are becoming expensive to retrieve.

As a result, the utilization of green or renewable energy sources, which are continuously replenished and do not give an adverse impact on the environment, is constantly growing. The growing use of renewables deliver a very important message to all the market players forming their expectations of further oil prices fluctuations.

4.4. Development and introduction of new technologies

Technological development has profoundly affected costs, quality and environmental impact of energy generation. A good example for this is the development of new technologies, which made the production of shale oil and gas commercially attractive. This allowed the USA to again become one of the largest oil and gas producers. The inflow of shale oil to the market has become one of the main reasons, which led to the oil price plunge of June 2014. There are so many other new technological developments, which affected the market. They include, for example, the combined-cycle gas turbines (CCGT), cogeneration of heat and power in modular, small-scale energy systems, wide-spread application of information technologies, etc.

And there is much more to follow. Future energy options may include controlled thermonuclear fusion, fuel cells, etc.

4.5. Success of energy efficiency and energy conservation efforts

Another very important and often omitted factors are energy efficiency and energy conservation. As rightly mentions Stephan Kohler, president of German energy agency Dena, these aspects are the "most misunderstood of the energy transition, and yet the ones that work best." Other countries also provide excellent examples: California's efficiency success has avoided the amount of power needed from 30 power plants thus far and is expected to avoid another 11 power plants' worth of electricity over the next decade because cutting energy waste reduces the need to generate power from fossil fuel power plants.

4.6. Expected influx of Iran crude oil to the market

The influx was expected after lifting the sanctions imposed by the United States, European Union and United Nations. The sanctions were actually lifted on 16 January 2016 in exchange for curbs on Iran's nuclear program, but discussions of this possibility started earlier and seriously contributed to the negative oil price shock expectations. Possessing huge reserves of quality crude oil, Iran, which was several years ago pushed from the international markets out, was and is very keen to get back its market share. Market players were expecting that in order to achieve this goal the country would apply dumping strategy pushing oil prices further down. It did not happen because the relations between the USA and Iran remained strained and in May 2018 President Trump announced that the USA quits the Iran nuclear deal.

4.7. Slowdown of China's economic development

This is a very important factor, which actually raises red flags for the global economy. There were a growing number of pessimistic forecasts of China's further economic development. For instance, in 2014 Fitch rating agency warned that a sharp slowdown in China's GDP growth rate to 2.3

percent during 2016-2018 would keep commodity prices low for longer than expected period of time. This forecast did not materialize either. *Vice versa*, in January 2018 the International Monetary Fund raised its forecast for China's economic growth in 2018 to 6.6%, up from the 6.5-percent prediction made in October 2017.

4.8. Political instability

Growing political instability in the world, which initially pushed oil prices up, then forced oil importing countries to reduce their dependence on foreign energy supplies. This is yet another market driver and yet another expectation, which decreased global oil prices.

In any case, we should not underestimate the uncertainty of the oil market, which has many times shown that most of expectations regarding it behavior appear to be wrong. This issue has been studied by many authors, for example Allsopp and Fattouh (2011) point out that "In the longer term, the uncertainties remain very great, especially since the tensions between a realist view of likely energy-market developments and the imperatives of the climate change agenda remain unresolved", but the current paper does not concentrate on this issue. The same view is shared by US Energy Information Administration (2016) "Expectations for future world oil prices are another key source of uncertainty in the IEO2016 projections" and Baumeister and Kilian (2016a) "Although our understanding of historical oil price fluctuations has greatly improved, oil prices keep surprising economists, policymakers, consumers and financial market participants."

In normal times, the broad effects of the oil price drop on the global economy are well known. It should act as an international stimulus that will nevertheless redistribute heavily from oil producing countries to consumers and the longer the new prices endure; the more profound will be the effects on the structure of industries across the world. Examples of such effects may be the increase of global economic growth and removal of fossil fuel subsidies.

But this time, economists are actively debating whether the world has changed and other moving parts - such as falling inflation levels and the strong dollar - will affect the usual economic relationships. This time there are more voices than usual suggesting expectations of a global boost are deceptive. “Stephen King, chief economist of HSBC, believes lackluster demand in China, Japan and Europe over the summer of 2014 was the primary cause of the collapse in prices so the traditional “lower oil prices good: higher oil prices bad” story is “no longer so obviously true”. He then argues that optimism following an oil price fall in economic estimations is based on positive supply-side developments for the western developed world, but “there are plenty of situations where falling oil prices are merely symptoms of a wider malaise”[5].

There is one more, probably the most important point to be taken into consideration: we have mostly extracted the cheapest-to-extract oil. It takes more and more human efforts, capital, etc. to produce a given number of barrels of oil equivalent. It is expected further growth of oil production costs in the future. However, the uncertainties surrounding the oil market prevent from making any serious projection about oil prices.

[5] https://www.ft.com/content/3f5e4914-8490-11e4-ba4f-00144feabdc0

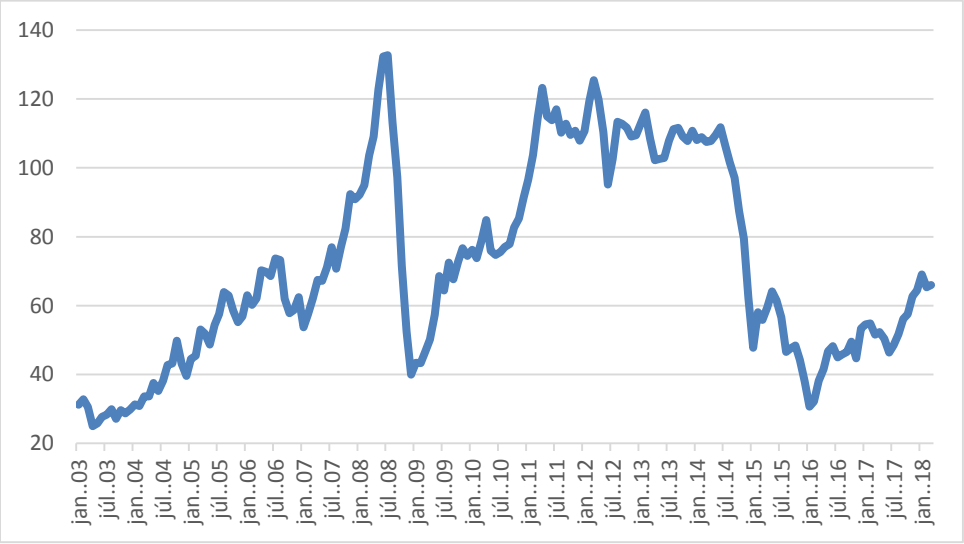
5. Consequences for oil-exporting and oil-importing countries

5.1. Background

The previous researches of the consequences of oil price slumps were addressed in the Literature review part of this dissertation. In this chapter, an attempt to study the consequences of negative oil price shocks is presented.

The chart below illustrates crude oil price movements by the beginning of 2018. Just over the last 10 years the oil price exceeded US$130 per barrel in the first half of 2008 and dropped up to almost US$40 per barrel in the second half of the same year. It gradually grew again and exceeded US$100 per barrel staying at this level for several years. Then another oil price plunge started in June 2014. Obviously, these sharp and unpredictable oil price shocks affect the global economy because oil remains the major energy source and an important raw material for chemical industry throughout the world. This chapter is devoted to consequences of these fluctuations for oil-exporting and oil-importing countries.

Figure 4. Average monthly Brent crude oil price from 2003-2018 (US$/bbl)



Source: US Energy Information Administration

5.2. Consequences for oil-exporting countries

The dissertation mainly focuses on Kazakhstan, but in this chapter the effects of oil prices decline for oil-exporting are considered on examples of Azerbaijan and Kazakhstan. This provides a better picture of the situation.

Economic consequences

The oil and gas industry plays an important role in the economic development of Kazakhstan and Azerbaijan. It is one of the main drivers of GDP growth and an important source of national budget revenue for both countries.

In Kazakhstan, the share of oil and gas industry in total GDP increased from 10.9% in 2001 to 25.2% in 2012 making it the main driver of national economy. By the beginning of 2016 this share again decreased to about 20% of GDP, but this happened because of the decrease of world prices on these commodities only[6].

In Azerbaijan, the contribution of hydrocarbons to GDP is even higher, with about 50% of GDP, despite the government's intentions to reduce this level.

Worth pointing out that numerous attempts of the governments of both countries to diversify their economies failed. Lower profitability of non-oil sector[7] and wide-spread corruption are the main reasons for the failures. For example, Asian Development Bank (2013) stated that "the (Kazakh) economy is less diversified today than it was 10 years ago". The situation with economic diversification in Kazakhstan will be further developed in this dissertation.

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6 http://www.ey.com/Publication/vwLUAssets/Kazakhstan_oil_and_gas_tax_guide_2014/$FILE/EY-Kazakhstan_oil_and_gas_tax_guide_2014.pdf

7 Per the information of the Ministry of Oil and Gas of Kazakhstan, the profitability of oil companies within the period from 2007 to 2011 varied from 126% to 158% with an exception of 2009 when the profitability dropped down to 67%. This drop was conditioned by the world economic and financial crisis. No later data is available.

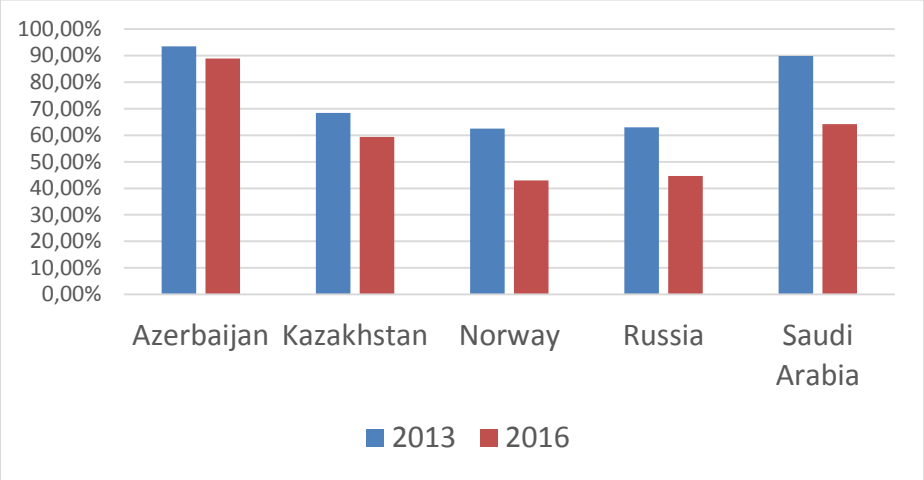
Revenues from the oil and gas sector generate a half of fiscal revenues of Kazakhstan. On 1 September 2016 the Kazakh president pointed out that the export of oil makes about 60% of the country's total exports (other exports include mainly non-ferrous and ferrous metals and grain).

Table 1 below illustrates the dependence of several oil-exporting countries on oil and gas industry and the change of the share of petroleum and refined products in total exports since the beginning of the oil price plunge. The change in this share is stipulated by the decrease in global oil prices.

Table 1. Petroleum[8] and refined products share in total exports, 2013 and 2016

Country	2013	2016	% of change
Azerbaijan	93.4%	88.9%	-4.8%
Kazakhstan	68.4%	59.4%	-13.2%
Norway	62.5%	43.0%	-31.2%
Russia	63.0%	44.7%	-29.0%
Saudi Arabia	89.8%	64.2%	-28.5%

Figure 5. Petroleum and refined products share in total exports, 2013 and 2016



[8] Petroleum, complex mixture of hydrocarbons that occur in the Earth in liquid, gaseous, or solid forms. The term is often restricted to the liquid form, commonly called crude oil, but as a technical term it also includes natural gas and the viscous or solid form known as bitumen, which is found in tar sands. The liquid and gaseous phases of petroleum constitute the most important of the primary fossil fuels.

Source: Massachussetts Institute of Technology Media Lab (2018)

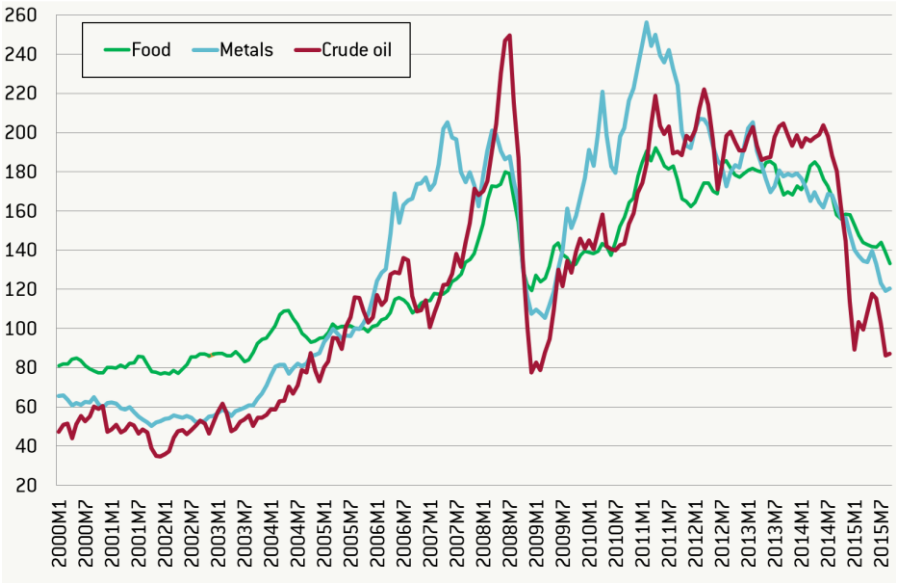
Liquid and gaseous hydrocarbons are so intimately associated in nature that it has become customary to shorten the expression "petroleum and natural gas" to "petroleum" when referring to both.

Additional 10% of the Kazakh export is composed of ferrous and non-ferrous metals, radioactive substances and precious metals, which are also subject to cyclicality of prices. Moreover, as shown on the chart below, their price cycles as well as price cycles of food which is another Kazakhstan's export commodity nicely coincide with oil price cycles.

The true dependence on oil revenues is even higher because "non-oil" taxes depend on oil-fuelled spending.

At the first glance, the dependence of Azeri economy on oil price fluctuations is higher and the country is suffering more. In reality, as already mentioned above, the prices on other Kazakhstan's main export commodities, namely metals and agricultural products have also declined giving their cumulative negative effect.

Figure 6. Commodity price indices, 2000-2015 (2005 = 100)



Source: Bruegel (http://bruegel.org/)

Because of the oil sector development, the non-oil sector of the economy in both countries remains undeveloped and very fragile with significant obstacles to both domestic and foreign investment. One of the main obstacles to investment is the high-level corruption in these countries. This legacy of corruption dates back to Soviet times and currently the huge injections of money from the oil and gas sector are considered as the greatest sources of corruption. The governments undertake different anti-corruption measures, e.g. introduction of relevant legislation requiring public officials to disclose their assets on an annual basis. However, bureaucratic control often hinders the enforcement of applicable legislation and regulations. Laws and decrees are adopted, but their implementation is often delayed or sabotaged. Also, there are numerous cases when anti-corruption slogans were used to disguise wars between different oligarchic clans.

It is important to point out that much of the non-petroleum share of the economy of these countries is attributed to public expenditures and government contracts, which are financed mainly by the countries' petroleum export revenues. Even leading industries in the non-oil economy, such as construction and transport, are indirectly funded by the oil sector.

This means that in periods of economic decline it is difficult to expect that non-petroleum businesses will support the economic development and partially substitute declined revenues from the oil and gas sector. As mentioned above, non-petroleum industries are for the big extent financed by contracts of oil companies or petroleum export revenues. For instance, machine-building was mostly relying on oil companies' contracts. When oil prices are low oil companies are cutting their investments and consequently revenues of Kazakh machine-building enterprises decline.

Contributing such a huge share to GDP, oil and gas sectors of both countries provide employment to a very small portion of populations. In 2010

Azerbaijan's non-oil industries accounted for only 8% of GDP, while during the same year, agriculture performed poorly at 2.2% (World Bank Indicators, 1995-2010). Current estimates indicate that the oil and gas industries are responsible for a little over 1% of employment in Azerbaijan, while agriculture employs nearly 50% of the country. The Kazakhstan's economy is relatively better diversified, but suffers from the same problems.

In the recent past, the abundant oil revenues allowed for the governments of Azerbaijan and Kazakhstan to achieve success in reducing poverty. Although social transfer measures have reduced the number of people below the poverty line, these transfers did not automatically lead to sustainable poverty reduction. This happened because the economic success achieved during the period of high oil prices in general and success in reducing poverty in particular have been largely lost since mid-2014. The main factors that contributed to the new situation were the reduction of oil and gas sector revenues, harsh devaluation of national currencies, effect of economic sanctions imposed upon the Russian Federation, etc.

In addition to that the both governments became over-enthusiastic over such expensive and prestigious projects like the first European Games in Baku, Azerbaijan, the 2011 Asian Winter Games in Almaty, Kazakhstan, EXPO 2017 in Astana, Kazakhstan, etc. The irony is that the splurge of public funds aimed at receiving positive international image did not serve this purpose well and was accompanies by numerous theft and corruption scandals.

The economic situation in Azerbaijan is quite similar to the one in Kazakhstan with less diversification of national economy. This resulted in more powerful consequences of the oil prices plunge.

The reduction of oil revenues negatively affected practically all economic and social aspects of life in Azerbaijan and Kazakhstan**.** One of the most important indicators of changing situation is the exchange rates of local

currencies to US dollar. The problem is that the central banks in these countries are not sufficiently independent institutions, and the exchange rate is usually considered as a part of unwritten social contract according to which the governments treat the exchange rate as one of the main factors of social stability. However, keeping the high exchange rate of national currencies against US dollar became too expensive affair for central banks. On 21 February 2015 the Azerbaijan Central Bank devalued the national currency manat by 33.86%. Similar though even harsher processes happened in Kazakhstan.

As a result of the economic crisis caused by the oil price plunge in 2015 for the first time in many years, Kazakhstan has seen a reduction of public spendings in tenge (national currency) terms - by 5%, and in dollar terms - by 15%. This led to a sharp drop in income generation within the economy and, consequently, consumer demand. Other results are high inflation, decreased wages and a sharp reduction in consumption expenditures, especially on durable goods.

In the past, both countries created sovereign wealth funds in order to manage the increased inflow of oil revenues. Because of the oil price plunge, the studied countries started facing budget deficits. As a result, the growth of assets of their sovereign wealth funds, which were rising at a rapid rate, was discontinued; and the governments started drawing on their buffers.

According to IMF estimations, most of sovereign wealth funds (excluding Norway, UAE, Qatar, and Kuwait's ones) will run out of buffers in four to seven years if oil prices stay at the level of 2015. Even though these countries will still be able to borrow, governments of these OECs should reduce spendings if they plan to achieve the dual objective of sharing oil wealth equitably with future generations and economic stabilization. Another point we should look at is as stated by N. Volchkova, Policy Director of

CEFIR[9], Moscow "any changes in the oil price level affect the economy not only in a nominal way, but also in a structural manner. A change impacts the cost of production in all industries and sectors, as well as the disposable income in the country, but it also affects the exchange rates and the overall uncertainty. This, in turn, affects exports, imports, current accounts, the comparative advantage of countries, as well as the global value chains. In an economy where labour, capital and energy are inputs to production, and capital/labour and energy are complements, a sudden oil price increase is likely to be compensated by labour adjustments. Thus, there might be a structural effect on employment, affecting the entire economy.

Furthermore, there are also large exchange rate devaluations associated with a drop in oil prices, creating import substitution and export expansion for oil-exporting countries like Russia. Lastly, Volchkova concluded that the negative effects of oil price shocks on trade balances could be dealt with by suitable policy measures diversifying the commodity composition of trade as well as the geographical composition of trade partners" Le Coq and Trkulja (2015).

The presented research is especially significant because the problems experienced by Azerbaijan and Kazakhstan are very similar to those, which face other OECs of the former Soviet Union.

It is also interesting to see how the oil price plunge affected the oil exporters' fiscal breakeven oil prices. The years 2013 and 2016 have been selected as the year preceding the oil price plunge and year with the lowest oil prices respectively. The fiscal break-even oil price is the average oil price which is needed for an oil exporting country to balance its budget in a particular year. It is a key metric for a country's fiscal vulnerability to oil. If the break-even price is higher than the market price budgets cannot be balanced[10].

[9] The Centre for Economic and Financial Research (CEFIR) http://www.cefir.ru/?l=eng
[10] http://crudeoilpeak.info/opec-fiscal-breakeven-oil-price-increases-7-in-2013

Figure 7. 2013 External breakeven oil price curve

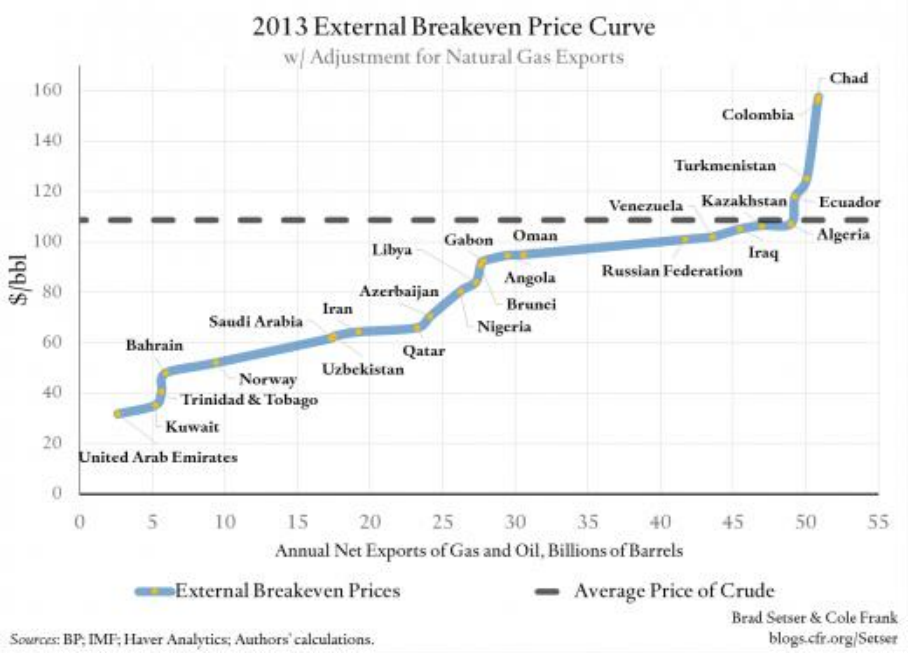
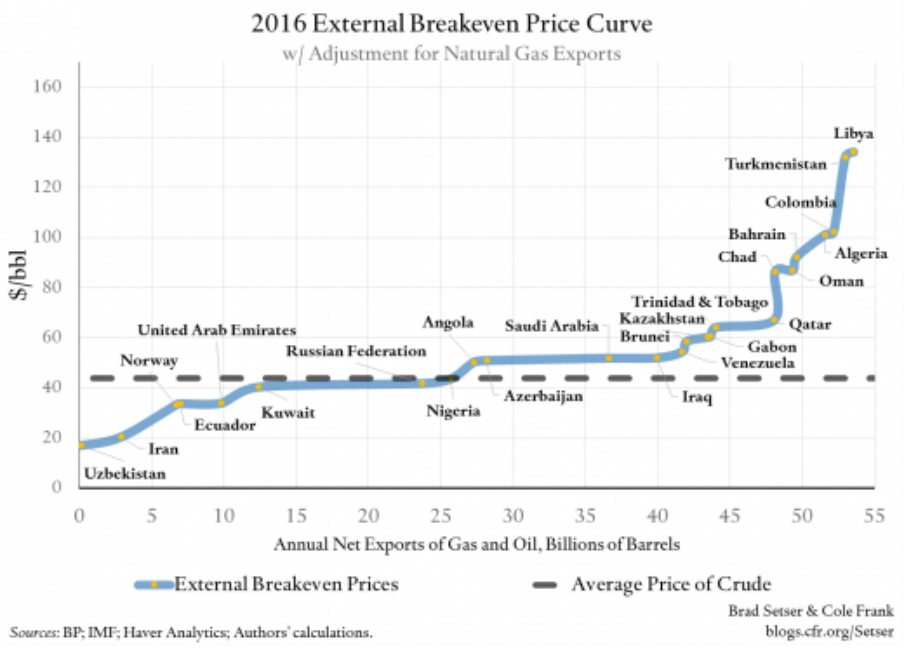


Figure 8. 2016 External breakeven oil price curve



Source: Council on Foreign Relations[11]

[11] https://www.cfr.org/blog/follow-external-balance-payments-breakevens-oil-exporters

Figures 7 and 8 above demonstrate that only few countries managed to have the ends meet after the beginning of the oil price plunge. These countries include Russia and Iran, which achieved a real progress in terms of diversifying their economies and managing their national budgets and payment balances. More detailed information about these two countries is provided in the Chapter 11 below.

In addition to the economic, these countries face serious and mostly negative social and environmental consequences, which can be briefly described as follows:

Social consequences

Being major taxpayers and employers and financing different social programs additionally oil and gas companies usually make very positive contribution to the social development of countries and territories where they operate. In some remote or underdeveloped territories, oil and gas companies are the only contributors to the social development. The other side of the story is that providing substantial positive contribution oil and gas producers create numerous social problems, which can be described as follows:

- Growing social inequality: oil and gas producers usually pay better salaries, provide better housing, working conditions, etc. than other employers. This creates social discontent
- Substantial inflow of migrants searching for employment opportunities. As it happens in many other countries the relations between the local population and migrants are strained. This topic will be described in detail further below.
- The population of the territories where oil and gas companies operate is often dissatisfied if there is no adequate improvement of the social sphere in their regions. The main reason for this is usually the mismanagement of oil and gas revenues by central government entities.

- Probably the main problem is what will be happening with the population and social sphere of these countries after oil and gas revenues come to an end.

Environmental consequences

By no means can oil and gas production be considered as a green economic activity. Exploration, production, transportation, storage and usage of oil and gas have well known negative effects on the environment. Even though technological advances help reduce these effects, they cannot eliminate them completely. It is true that oil and gas producers pay environmental taxes to national and local budgets, make obligatory contributions to different non-budgetary environmental funds, have special provisions in their sub-soil use contracts obliging them to compensate any environmental damage and pay for rehabilitation of grounds and other natural objects, which condition was affected by their activities. In the periods of low oil prices, government entities and oil companies allocate substantially smaller funds for financing environmental protection activities.

Similarly to the case of social problems, providing substantial positive contribution, oil and gas producers create numerous environmental problems, which can be described as follows:

- Many OECs are the leaders by ecological footprint per capita (especially the Gulf countries);
- Mismanagement of environmental payments by government entities;
- Insufficient enforcement of environmental legislation.

Considering the consequences of oil price fluctuations for oil-exporting countries, it is essential to always remember one crucial question: what will happen with the economies, the social sphere and the environment of these countries after oil revenues come to an end? The answer is well known – not only declare sustainability as the country's main development priority, but also adhere to the strict implementation of sustainable

development policies. The sustainability matters also addressed further below.

5.3. Consequences for oil-importing countries

After considering the situations in oil-exporting countries, it is logical to briefly look at the situations in oil-importing countries, especially in the countries importing crude oil from Azerbaijan and Kazakhstan. These countries include Mediterranean and European countries and China, but the paper is limited to China and Turkey.

In general, the new situation on the oil market affects the oil-importing countries positively. The low course of world oil prices is very important for energy importing countries like China and Turkey. It should be noted that low oil prices do not affect oil-importing countries in a positive way only. For example, one remembers such positive factors like decrease of inflation and current account deficit, but there are other factors, which do not create a positive impression. This is mainly the decreased demand by oil-exporting countries on goods produced in oil-importing countries. Another serious consideration is that a portion of the positive contribution of the drop in oil prices is taken back with the increasing foreign exchange rates mainly against the US dollar. This is especially true for such major exporters of manufactured goods as China and Turkey because increased foreign exchange rates against the US dollar negatively affects the ability of these countries companies to purchase raw materials, equipment, spare parts, etc. the prices for which are denominated in US$.

The research addresses economic effects of the fall in world oil prices on economic situation in the countries mentioned above. The available scientific works are limited, but already exists. These studies include the works by Maghyereh et al (2017) who studied the influence of oil price uncertainty on the real economic activity in Jordan and Turkey. Their “result is consistent with the previous finding that oil price uncertainty is negatively

associated with output." Also, their findings "imply that sound energy policies that mitigate the effect of oil market uncertainty may help in stabilizing output in both countries."

The Chinese economy shows a different picture and "the impacts of intertemporal global oil price shocks on China's output are often small and temporary in nature" Cross and Nguyen (2017). However, the overall influence of oil price shocks on Chinese economy should not be underestimated. For example, the same Cross and Nguyen (2018) state that "Positive energy price shocks are found to generate statistically significant reductions in real GDP growth and increases in inflation". Kim et al (2017) are of the view "that the oil price shock becomes an increasingly important source in the volatility of China's interest rate." Their findings are echoed by Ding et al (2017) who point out that "International crude oil prices made a greater early contribution to investor sentiment and showed a rapid growth trend".

Also there are different opinions. For instance, Favolino and Zachmann (2016) analysed the impact of low oil prices on EU GDP and doubt that low oil prices give it a serious positive impact. They considered three possible causes of oil price decline: real changes in supply, real changes in demand and changes in expectations regarding the future oil demand-supply balance and find that:

- A supply shift has no significant impact on EU GDP within the following three years. Hence, the impact of increasing supply in 2015/2016 should not boost GDP.
- Higher aggregate demand, that also caused oil prices to rise, let to even higher GDP 18 month later. Hence, the lower aggregate demand that caused oil-prices to decrease in 2014 and early 2016 should have a depressing effect on GDP – while the positive demand shock

identified for 2015 should have an inflating effect on GDP. Overall, the magnitude of the negative aggregate demand shock should prevail.

- Finally, expectations regarding the future oil demand-supply balance which drove down oil prices used to have a positive impact on GDP. Consequently, the observed lower oil prices, which are primarily driven by such expectations, might well be a good sign for the EU economy.

This chapter finishes with Table 2, which shows the level of dependence of every considered country on energy imports/exports. The word "energy" in this context means predominantly hydrocarbons, i.e. oil and gas.

Table 2. Energy imports, net[12]

Country	% of energy use
Azerbaijan	-328
China	14
Kazakhstan	-107
Turkey	72

Source: (The World Bank, 2017a)

[12] Net energy imports are estimated as energy use less production, both measured in oil equivalents. A negative value indicates that the country is a net exporter. Energy use refers to use of primary energy before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport.

6. Situation in Kazakhstan as an oil-exporting country

6.1. Kazakhstan's economy during the periods of low oil prices

Introduction.

As this dissertation is focusing on Kazakhstan, the situation in this oil-exporting country since the beginning of this century considered separately.

Figure 9. Kazakhstan and the neighboring countries map

Source: Perry Castaneda Map Library at the University of Texas

The detailed political and administrative map of Kazakhstan is given in the Attachment 1.

Key facts:

Location:	The northern part of Central Asia.
Area:	Over 2.7 million square kilometers (the 9th biggest in the World)
Capital:	Astana
Population:	Over 18 million
GDP (2016):	US$133.7bn
GDP per capita (2016):	US$7510

Major sectors of economy: (mainly wheat)	Oil and gas, mining, metallurgy, agriculture
Main trade partners: countries.	China, Russia, Germany and other EU
Life Expectancy at Birth:	72 years

Kazakhstan experienced a tremendous economic growth from 2000 until the beginning of 2008 and was considered as one of the most dynamic emerging economies. Due to its strong economic performance Kazakhstan has become the first former Soviet republic to repay its debt in full to the International Monetary Fund in 2000, 7 years ahead of schedule. In September 2002, Kazakhstan became the first CIS country to receive an investment grade sovereign rating. In October 2000 the European Union raised Kazakhstan to the status of the market economy. On 26 March 2002 the U.S. administration represented by the Department of Commerce decided to withdraw the status of non-market economy from Kazakhstan under the U.S. Anti-Dumping Act. Based on the analysis of such indicators as convertibility of national currency, free level of wage, foreign investment, public control, control of production, corruption and barter business, human rights etc. the U.S. Department of Commerce raised Kazakhstan's status to market economy.

Two of the main catalysts for this growth were economic reforms and foreign investment, most of which were concentrated in the energy sector. However, underdeveloped infrastructure has been one of the major restrictions on the development of the national economy. This challenge is being addressed through modernization programs launched by national railway and telecommunication companies, construction of new and modernization of existing pipelines, creation of a national fleet and new facilities to support off-shore operations.

The last two economic crises have affected the country badly. The consequences of the current crisis have been described above. Here I would like to address the 2008 world financial crisis, the consequences of which the

country could not fully overcome by the beginning of the current crisis. In Kazakhstan, first signs of the 2008 crisis started earlier than in other countries - at the end of 2007 due to the need to repay large amounts previously borrowed by commercial banks. This caused a shortage of financing for medium and small businesses and especially the housing construction and industries servicing it in the first half of 2008. However, the big industries remained untouched until summer 2008 when the world economic and financial crisis started. Possessing huge foreign currency reserves, the Kazakh government managed to partially alleviate its negative consequences, though not fully. For example, having spent significant amounts of foreign reserves to support the national currency, in February 2009 the National (Central) Bank of Kazakhstan allowed for the national currency tenge to devaluate against US$ by 22% in one day. This has helped those Kazakhstan exporting companies, which sell in US$ and have tenge based cost of production. Import dependent businesses have suffered as a result.

As the World Bank has been warning in its overview of the country[13] "The economy's vulnerability to external shocks remains the main challenge to achieving stable and sustainable development. External demand from China and the Russian Federation, Kazakhstan's main trading partners, as well as global oil demand and prices, will continue to be the key external factors impacting Kazakhstan's economic performance. Domestic factors include the pace of implementation of structural and institutional reforms, especially in anticipation of a political transition over the medium term." However, having huge proved oil and gas reserves, the country continued to focus heavily on the hydrocarbons sector, which has attracted most of the foreign investments and provided most of its export revenue.

[13] http://www.worldbank.org/en/country/kazakhstan/overview

Kazakh economists warned about possibility of an economic crisis in advance. For example, Laumullin (2013) listed among some others the following challenges and threats for the economic security of Kazakhstan:

1. "Discontinuation of the rapid growth of oil prices;
2. Exhaustion of the possibilities for extensive economic growth, on the basis of which the Kazakh economy grew in previous years;
3. Continuation of a strong dependence of the Kazakh economy on external shocks."

General information about the Kazakh oil and gas sector and its role in the national economy

The following are three main characteristics of the Kazakh oil and gas sector:

1. Oil and gas sector is the main pillar of the national economy and internal economic stability;

Per the OPEC (Organization of the Petroleum Exporting Countries) data Kazakhstan is ranked as the 12th in the list of 15 countries that exported the highest dollar value worth of crude oil in 2016. Keeping in mind a relatively small size of Kazakh economy, which is ranked by (The World Bank, 2017b) as the 61st by the GDP size, we can have a better understanding of the role of this sector. It is and will in the foreseeable future remain the main and the most dynamic sector of the national economy providing the lion's share of GDP, budget revenues and foreign currency earnings. This will be described in more detail further below.

2. In the foreseeable future there is no any substitution to this sector neither in terms of budget revenues nor in terms of employment (in addition to direct employment, this sector provides employment in many businesses servicing it).

Kazakh government's efforts on reducing dependence on oil and gas sector have largely failed. This will be described in more detail below.

3. The Kazakh oil and gas sector is closely involved into international economic cooperation.

In addition to being one of the world's major exporters of crude oil and natural gas, the country also attracted different foreign oil and gas and service companies, which can be divided into the following main groups:

- International majors. This group includes such companies as Chevron, Shell, Exxon Mobil, ENI and others;
- Chinese and Russian companies: CNPC, Sinopec, CITIC, Lukoil, etc.;
- Other foreign oil companies: Maersk Oil, Petrom, Repsol, etc.;
- Service companies: Halliburton, Baker Hughes, Schlumberger, etc.

In general, the development of oil and gas industry in the country plays a positive role and can be summarized as follows:

- The industry is the largest taxpayer;
- It provides well-paid jobs and business opportunities;
- Attracts substantial and long-term foreign investments;
- Improves infrastructure;
- Facilitates the development of other industries, new production facilities and services;
- Develops the country's human capital;
- It implements different social projects to support local population and government initiatives.

At the same time, there are serious negative consequences:

- The country is seriously dependent on oil revenues with substantial potential for Dutch decease[14] development;

[14] Dutch disease is the negative impact on an economy of anything that gives rise to a sharp inflow of foreign currency, such as the discovery of large oil reserves. The currency inflows lead to currency appreciation, making the country's other products less price competitive on

- Environmental degradation of oil-producing regions affecting the population's health in these regions negatively;
- Uneven development of different regions;
- Social polarization with salaries on the oil and gas industry (even for the same type and amount of work) substantially higher than in public sector;
- Negative affect on other industries when investments and the most capable individuals choose the oil and gas industry;
- Potential for social unrest;
- Development of corruption.

In any case, by now positive outcomes by far outweigh negative ones and no alternative for this industry in terms of revenue generation has been created. Government attempts to diversify the Kazakh economy addressed further below.

External environment

Substantial deterioration of external factors affecting the economy of Kazakhstan has been observed since June 2014 when the last oil price plunge started. These factors mainly included the oil price plunge as well as the recession in Russia, the slow-down of key trading partners especially in China, indirect effect of anti-Russia sanctions and negative effects of the membership in the Eurasian Economic Union.

The oil price plunge was especially painful for the country where the oil rents[15] amount to about quarter of GDP.

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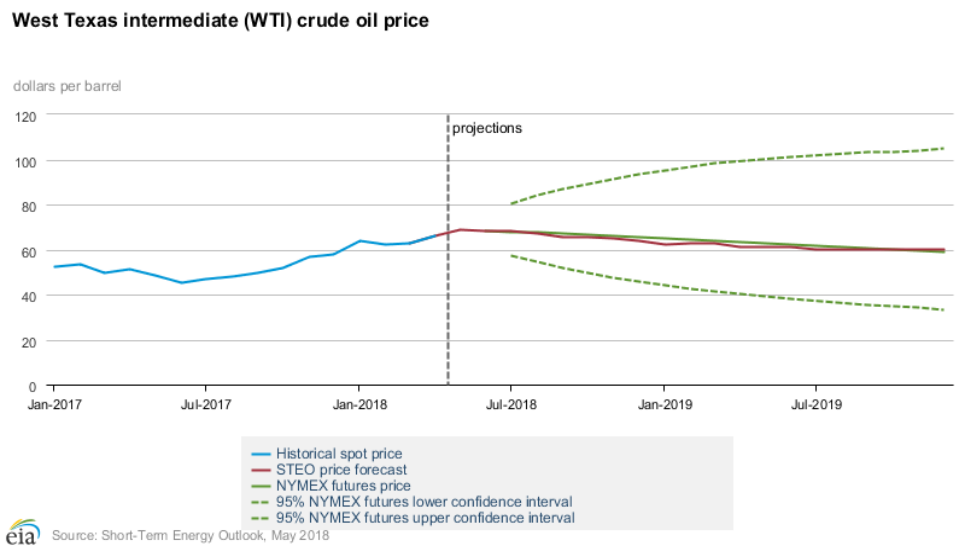
the export market. It also leads to higher levels of cheap imports and can lead to de-industrialization as industries apart from resource exploitation are moved to cheaper locations.
The origin of the phrase is the Dutch economic crisis of the 1960s following the discovery of North Sea natural gas.
http://lexicon.ft.com/Term?term=dutch-disease

[15] Oil rents are the difference between the cost of crude oil production at world prices and total costs of production

Another important factor is that public expectations are in general negative. Baffes (2015) expressed the opinion that “The drop in prices likely marks the end of the commodity super-cycle that began in the early 2000s”. This opinion shared by Kazakhstan government and private analytics. As you can see clearly from Figure 10 below, the substantial oil price increase of spring 2018 did not largely affect these expectations.

Figure 10. Crude oil price projections by the U.S. EIA

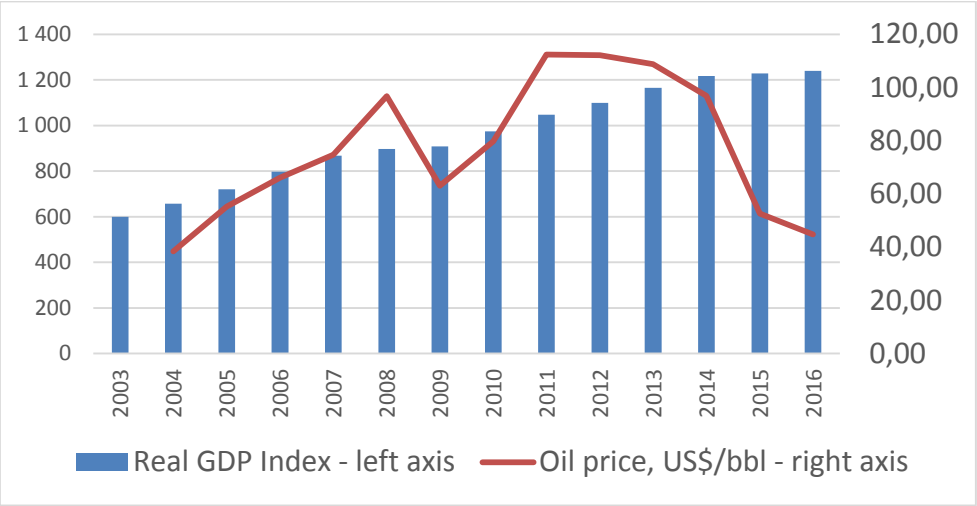


https://www.eia.gov/outlooks/steo/report/global_oil.php

National Economy

From the diagram below, one can see that till 2014 except a relatively short period of economic slowdown of 2008-2009 the Kazakh economy grew rapidly. Another period of economic slowdown started in June 2014.

Figure 11. Crude oil price and Kazakh GDP, 2003 – 2016



Source: Committee on Statistics of the Republic of Kazakhstan and Bloomberg markets

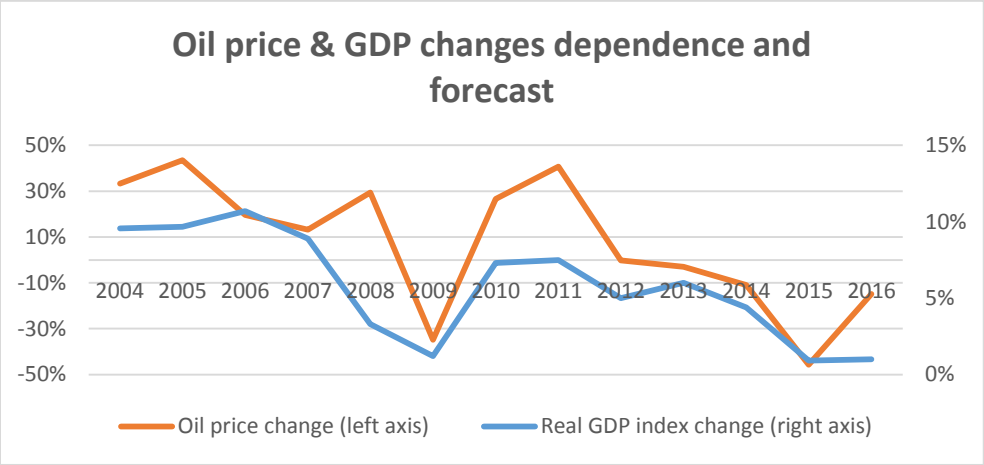
This diagram shows that there is no direct dependence between the real GDP index and oil price fluctuations. The correlation coefficient in this case is just 0.36.

This was facilitated by the increase in oil prices, fiscal and tax incentives and the growth of consumer lending. The situation changed dramatically after oil prices started to decline, so did the population income. Aggregate demand began to shrink. As a result, Kazakhstan's GDP growth has slowed down. The slowdown has been observed in all sectors of the economy, but most of all fall in the production one. Over time, the slowdown has spread to other sectors of the economy: services, construction, transportation as all of them depend on the incomes of population and businesses. Accumulated effect of external shocks began to influence practically all sectors of the national economy.

The picture changes completely if we look at the dependence between oil price and real GDP changes. Except a short period of oppositely directed trends of 2006 and 2007 there is a very good correlation between these two

indicators (0.78). The period of oppositely directed trends is explained by the financial crisis, which started in Kazakhstan earlier than worldwide.

Figure 12. Crude oil price and Kazakh GDP changes, 2003 – 2016



Source: Committee on Statistics of the Republic of Kazakhstan and Bloomberg markets

The budget surplus mostly created by oil revenues began to shrink when oil prices remained at a high level (above 100 dollars per barrel). The main reason for that was the government's economic and financial mismanagement.

The following information illustrates the situation well:

- During 2015, the international (gold and foreign currency) reserves of Kazakhstan, including gross reserves of the National (Central) Bank and the National Fund funds decreased by 10.6% to US$ 91.581bn.
- Since the beginning of 2014 the Kazak tenge has devaluated by 138%.
- The current account was in deficit of US$5.3bn in 2015 as opposed to a surplus of US$6.0bn in 2014. This is equivalent to 2.8% of GDP.
- On 18 February 2016 Standard and Poor's Rating Services lowered its long- and short-term ratings on Kazakhstan for both local and foreign currency to 'BBB-/A-3' from 'BBB/A-2'. Outlook Negative.

- Dividend payments on foreign direct investments dropped by 58.4% year-on-year to US$8.1bn in 2015, consistent with falling export revenues.

Sources: National Bank of Kazakhstan, Standard and Poor's Rating Services, Halyk Finance JSC.

The National Fund of Kazakhstan was established in 2000 and operates as both a stabilization (against fluctuations in oil, gas and metal prices) and a savings fund. It is financed through tax and royalties from the commodities industry.

The economic situation deteriorated further after the beginning of 2014 oil price slump. GDP growth slowed to 1.2 per cent in 2015 and remained subdued at 1.1 per cent in 2016 reflecting the difficult external environment with continued recession and rouble weakening in Russia, flat oil prices, and stagnant oil production as a result of delays in the Kashagan oilfield. Weaker investor sentiment as a result of the geopolitical crisis is also affecting growth. On the positive side, the announced fiscal stimulus program and ambitious reform agenda are expected to provide a boost for growth. GDP growth increased up to 3.7% in 2017 (World Bank estimate).

There were even expectations that the Kazakhstan's economy could contract by 2% in 2016, the first decline in real GDP since 1998. Luckily this did not happen. These expectations were based on low commodity prices, which could lead to a decline in extractive industries output and exports in 2016, i.e. low commodity prices lead to smaller profits of extractive enterprises while keeping production costs at the same level. Keeping in mind that Kazakhstan deposits are distant from main consuming areas and the country has no access to sea, the transportation costs of Kazakh goods are very high. At a certain point of time, this cost discrepancy is resulting in the situation when it is better to curtail production. Supporting this point of view the

Kazakhstan's crude oil output declined in the first half of 2016, but compensated by the increase in the second half of 2016.

Inflation and monetary policy

Kazakhstan instituted a freely floating exchange rate on 20 August 2015, abandoning its earlier narrow currency band linked to the US dollar and adopting a monetary policy that targeted inflation. Unfortunately, the shift to floating exchange rate was poorly communicated, thus largely undermining confidence in the currency.

Financial conditions also tightened, with credit to the private sector contracting significantly. The roughly 40 percent depreciation of the tenge against the dollar since the August 2015 and the move to a floating exchange rate helped to reduce external imbalances, but pushed up inflation above the 6-8 percent objective range and adversely impacted private sector balance sheets.

Kazakhstan's economy has faced the challenge of adjusting to large negative oil price shocks in the context of declining domestic and external demand. After a substantial drop of oil prices during the second half of 2014, the country witnessed another drop in the second half of 2015 reaching the lowest level of US$27.67 a barrel of Brent in January 2016, its lowest since 2003.

As pointed out by The World Bank (2015) "Meanwhile, China's GDP growth rate is estimated to have slowed to less than 7 percent, and Russia's economy is estimated to contract by 3.8 percent in 2015, affecting demand for Kazakhstan's exports and, thus, translating into lower economic growth and inflation for Kazakhstan.

Kazakhstan's GDP growth slowed from 4.1 percent (year-on-year) during the first nine months of 2014 to an estimated 1 percent during the same period in 2015.

In addition, foreign direct investment (FDI) inflows declined and the overall external balance deteriorated, putting downward pressure on the tenge".

6.2. Economic prospects

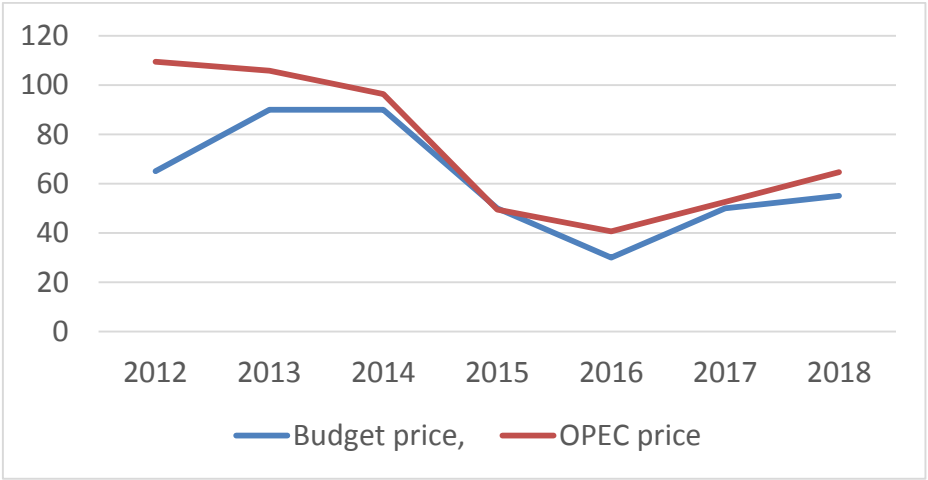
Average oil price assumptions used in the Kazakh budget shown in Table 3 below are a very good indicator of expectations the Kazakh government has with regard to economic prospects of the country. The higher the price, the better expectations are. However, the government is usually trying to pursue a conservative approach, keeping price assumptions below the real price of oil.

Table 3. Average oil price assumptions used in the Kazakh budget versus Average annual OPEC crude oil price, US$/bbl

Year	Budget price,	OPEC price
2012	65	109.45
2013	90	105.87
2014	90	96.29
2015	50	49.49
2016	30	40.68
2017	50	52.51
2018	55	64.7*

* forecast

Figure 13. Average oil price assumptions used in the Kazakh budget versus average annual OPEC crude oil price, US$/bbl



While the budgets were revised several times to reflect the changing oil prices, the government has been committed to continuing some stimulus expenditure despite sharply declining revenues. Real growth suffered from lower private consumption in response to higher import prices, and from diminished private investment as commodity producers see profits fall.

Even though the countries mentioned in the graphs above managed to decrease their breakeven oil prices substantially, the number of countries which cannot balance their budget at the current oil price level grew also substantially.

Considering the Kazakh real GDP growth it is interesting to know the contribution of different factors. Table 4 below is an illustration to this.

Table 4. Contribution of different factors to real GDP growth, 2012-15 (Percentage points)

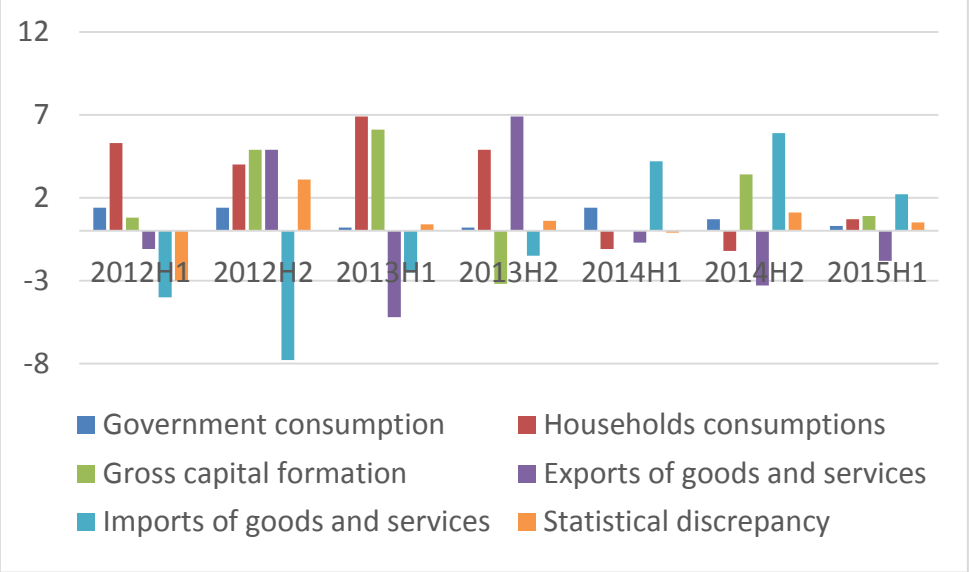
	2012	2012	2013	2013	2014	2014	2015
	H1	H2	H1	H2	H1	H2	H1
GDP growth	5.6	4.4	5.1	6.9	3.9	4.7	1.7*
of which:							
Domestic demand	7.7	10.3	13.3	2.0	0.3	3.2	1.8
Consumption	6.9	5.4	7.1	5.2	0.3	-0.2	1.0
Government	1.4	1.4	0.2	0.2	1.4	0.7	0.3
Households	5.3	4.0	6.9	4.9	-1.1	-1.2	0.7
Gross capital formation	0.8	4.9	6.1	-3.2	0.0	3.4	0.9
Fixed capital investment	0.5	3.4	1.2	0.9	0.8	-0.8	0.5
Net exports	-5.1	-2.9	-7.7	5.5	3.5	2.6	0.4
Exports of goods and services	-1.1	4.9	-5.2	6.9	-0.7	-3.3	-1.8
Imports of goods and services	-4.0	-7.8	-2.5	-1.5	4.2	5.9	2.2
Statistical discrepancy	-3.0	3.1	0.4	0.6	-0.1	1.1	0.5

Source: WB calculations based on Kazakhstan Statistical Office[16] data

16 https://openknowledge.worldbank.org/bitstream/handle/10986/23236/101506.pdf?sequence=5 page 3

Note: Some totals may not add up exactly due to rounding.

Figure 14. Contribution of different factors to real GDP growth, 2012-15 (Percentage points)



The situation improved significantly with the oil price growth in the second half of 2017 and the first half of 2018. Further prospects depend on the world oil price movements as no economic and policy reforms have been successful.

6.3. First reaction of the Kazakh economy on the last oil price plunge

The first reaction of the Kazakh economy on the oil price plunge has led to interesting conclusions. Table 5 below provides the dynamics of selected macroeconomic indicators of Kazakhstan from 2013, which is the last full year of high oil prices, to 2016, which is the year of the lowest oil prices. The data for 2017 are not yet available in full.

Table 5. Selected Kazakhstan macroeconomic indicators, 2013-2016

Year	Average Oil Price, US$/bbl	Real Wage Index	CPI	Export of Goods, US$ bn	Average US$/KZT rate
2013	108.8	464.16	238.43	91	152.2
2014	96.9	479.54	256.41	87	179.3
2015	52.6	468.93	291.09	52.8	222.7
2016	44.8	466.48	315.23	43.6	341.9

Source: Committee on Statistics under the Ministry of National Economy of the Republic of Kazakhstan

For illustration purposes, the table above is presented in the graphs below. The first graph is certainly the change of oil prices during these years.

Figure 15. Oil price dynamics in 2013-2016, US$/bbl

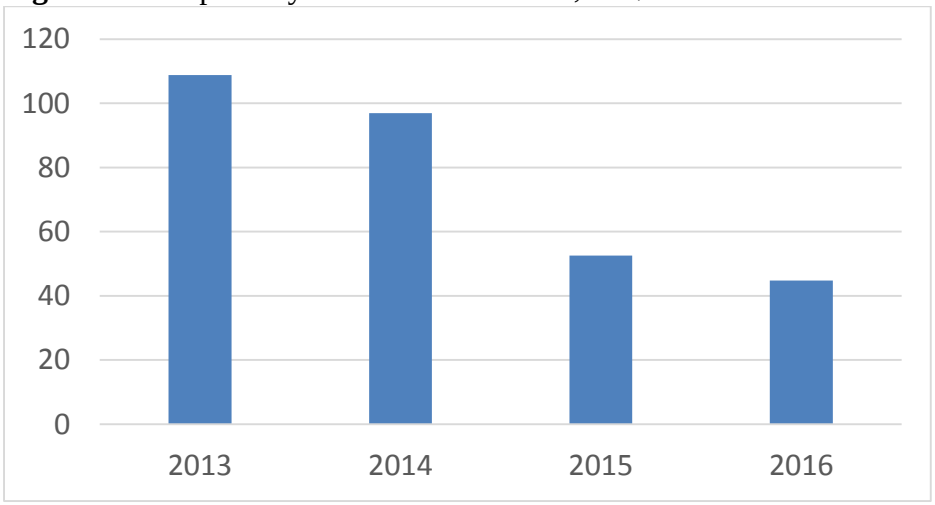


Figure 16. Real wage index dynamics in 2013-2016

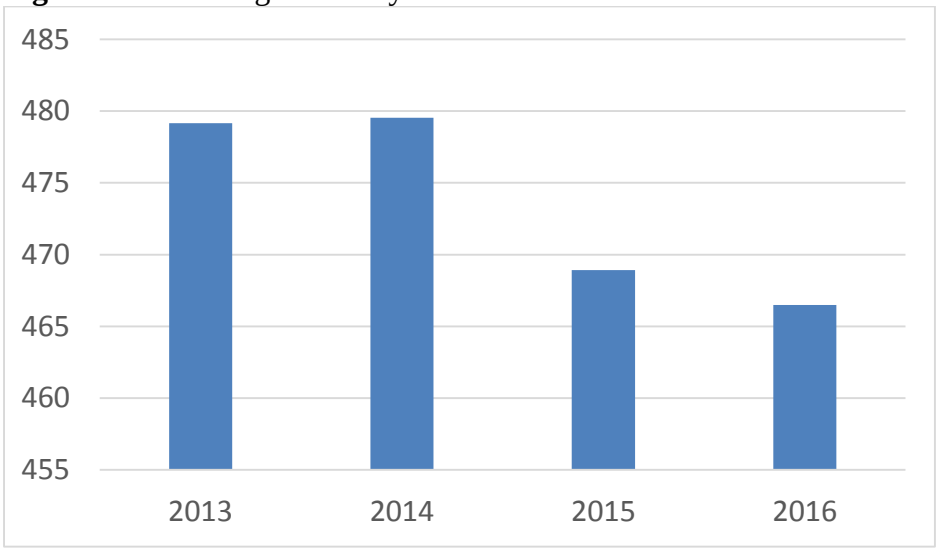


Figure 17. Consumer price index dynamics, 2013-2016

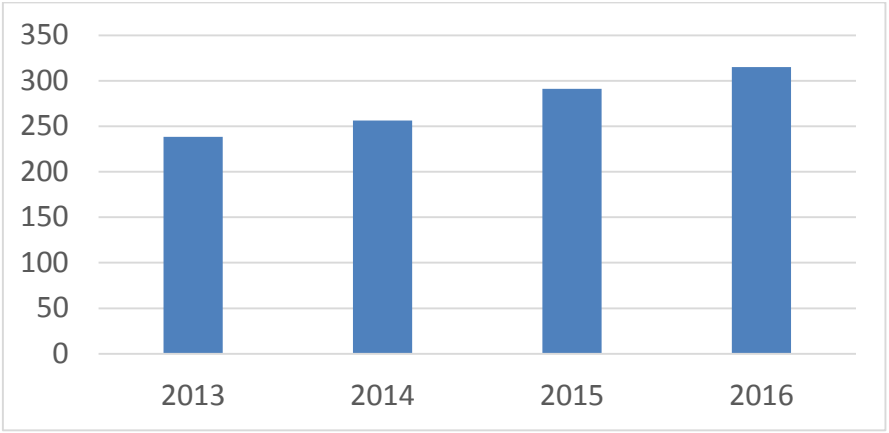


Figure 18. Export dynamics in 2013-2016, US$bn

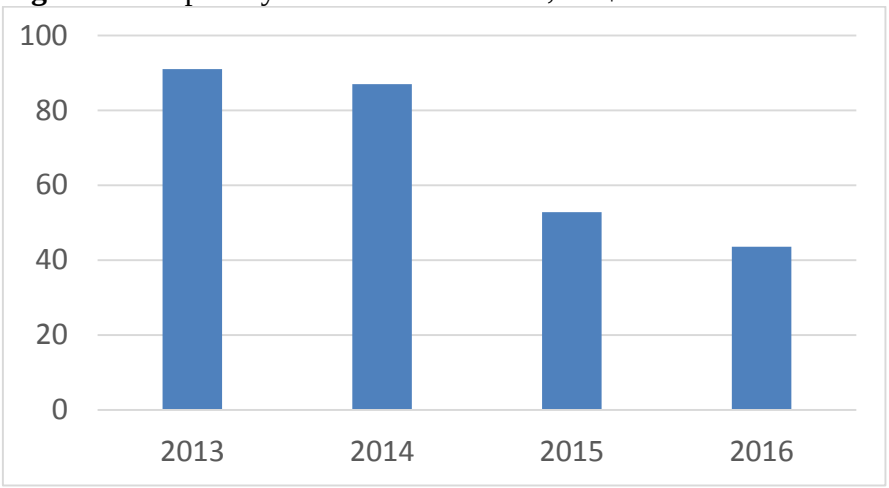
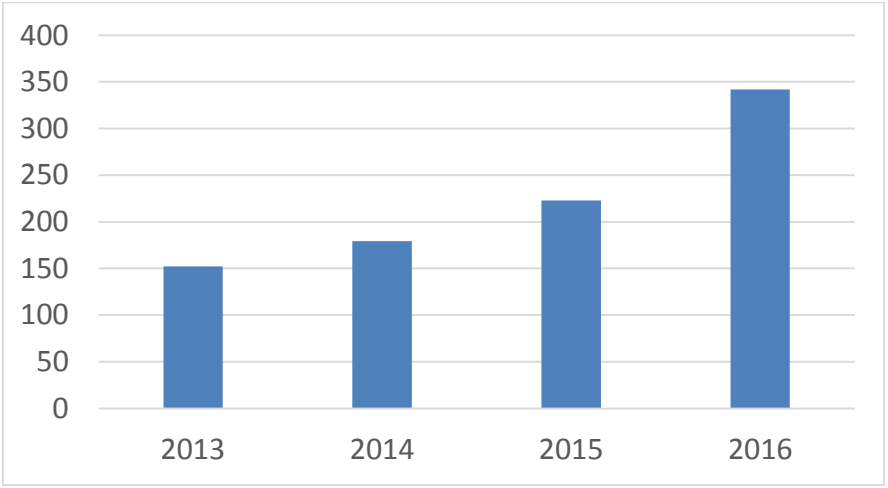


Figure 19. US$/KZT exchange rate dynamics in 2013-2016



The first reaction of the Kazakh economy on the oil price plunge demonstrates the immediate deterioration of Kazakh main macroeconomic indicators after the decline of oil prices. It is obvious that such a short time period cannot reflect the real situation. The graphs above illustrate only the first reaction of the economy. More detailed analysis is undertaken below using the econometric model.

6.4. Migration

Special attention should be given to the migration situation especially in the Western oil producing regions of Kazakhstan. Actually the migration situation in Kazakhstan is one of the most complex in the World. The last oil price plunge has seriously affected not only the Kazakh economy, but expectedly the social sphere in general and the migration situation in particular. It is critical to specifically address these regions because they have attracted well more than half of all foreign labor force officially working in the country as well as most of illegal and in-country migrants. Also we should not omit one very important factor – in the oil producing regions of the country the relations between the local population and labor migrants are traditionally strained. Over the last 30 years there were many cases of riots, social unrests and clashes between Kazakh and foreign workers. These facts demonstrate how critical this problem is and that neglecting it by businesses, government entities and the local population can provoke further social problems.

Changes in dimensions, characteristics, causes and consequences of migration have become one of the most significant consequences of the last oil plunge, which started in June 2014.

Kazakhstan is usually not in the limelight of discussions on migration issues. However, this does not imply low level of migration intensity in Kazakhstan. This is not true at all. Ratha, Plaza and Ozden (2016), World Bank advised that “Despite the media focus on migration to high-income OECD countries, South-South migration is larger than South-North migration.

Outside the high-income OECD countries, Saudi Arabia, the United Arab Emirates, India, Thailand, Jordan, Kazakhstan, and South Africa are among the top host countries, mostly for migrants from neighboring countries".

Recognizing the importance of both voluntary migration and forced displacement in the region, the United Nations High Commissioner for Refugees launched the Almaty[17] Process, which "is a regional consultative process on refugee protection and international migration and aims to address the multiple challenges resulting from mixed migration dynamics and enhance regional cooperation and coordination on mixed migration." UNHCR (2017)

Based on UN Population Division estimates, Migration Policy Institute (2017) (MPI) ranked the country 16th as a destination country and 13th as a sending country. According to MPI data, in 2015, the immigrant population of Kazakhstan was 20.12% of total resident population; and in the same year 18.78% of all citizens of Kazakhstan lived outside their country of origin. Thus, Kazakhstan along with Australia, Canada, New Zealand, Saudi Arabia and the United Arab Emirates is among the countries with the biggest share of migrant population in the world UN Population Division (2017).

The International Organization for Migration "defines a migrant as any person who is moving or has moved across an international border or within a State away from his/her habitual place of residence, regardless of (1) the person's legal status; (2) whether the movement is voluntary or involuntary; (3) what the causes for the movement are; or (4) what the length of the stay is."[18] This part of the dissertation mostly concentrates on external migration referring to internal migration when necessary.

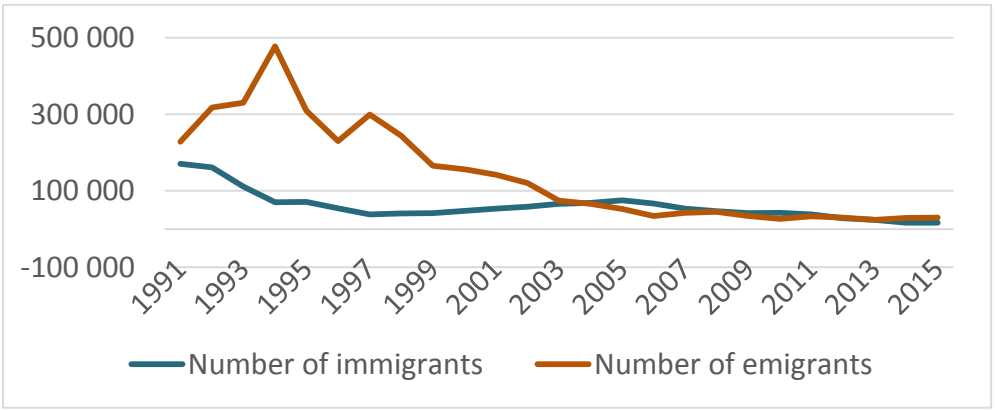
The situation with migration in the country is unique and characterized by the following:

[17] Almaty is the biggest city and former capital of the Republic of Kazakhstan
[18] https://www.iom.int/who-is-a-migrant

- Massive emigration of the population of European origin after the collapse of the USSR;
- Transfer of the country capital from Almaty to Astana in 1997 and massive migration of the population to the new capital;
- Repatriation of ethnic Kazakhs (oralmans);
- The country is in the UN List of twenty countries or areas of origin with the largest diaspora populations (4 million) International Migration Reports (2015, 2016);
- Influx of foreign labor force. Mostly from Central Asia countries, China and Turkey;
- Simultaneous urbanization and de-urbanization processes;
- Development of transit and illegal migration.

The dynamics of migration in Kazakhstan since 1991 is shown in Figure 20 below.

Figure 20. Number of immigrants and emigrants in Kazakhstan



Source: Own construction based on Committee on Statistics under the Ministry of National Economy of the Republic of Kazakhstan data

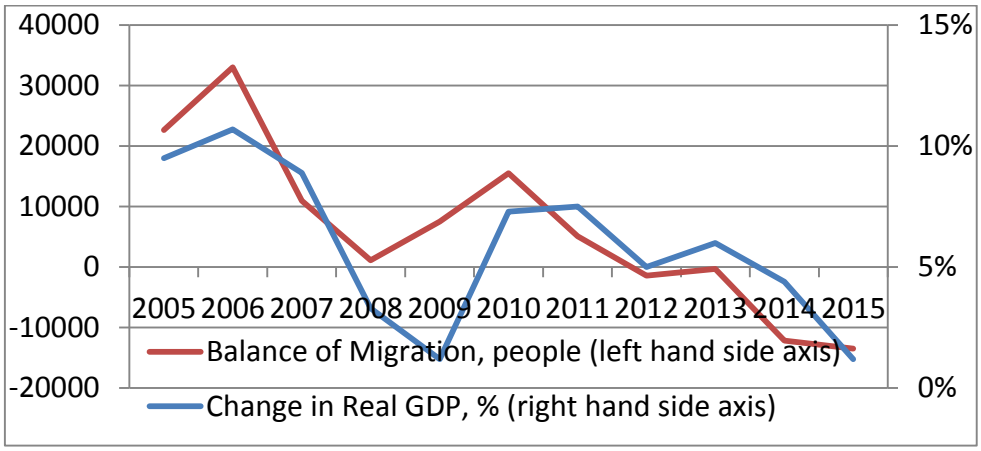
Figure 20 above shows that the migration situation in Kazakhstan is characterized by two oppositely directed trends of immigration and emigration. Since 2003, these trends have almost compensated each other giving very small numbers of the balance of migration.

So, the question of this research is what could be potential government policy measures to mitigate negative social consequences of the current economic crisis.

Correlation between Kazakh GDP change and migration processes

Expectedly, many researchers as well as the Kazakh government agencies (for example Sadovskaya (2014) and MinEconomy (2015)) noted the dependence between economic growth and migration processes in the country. It is suggested to look at the situation in more detail.

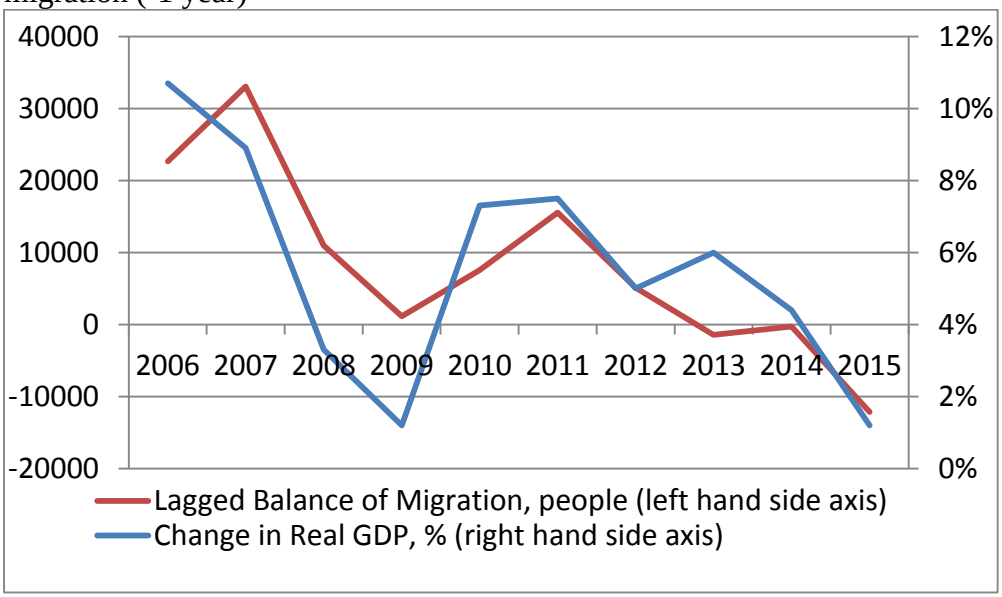
Figure 21. Correlation between change in real GDP and balance of migration



Source: Own construction based on Committee on Statistics under the Ministry of National Economy of the Republic of Kazakhstan data

If we look at Figure 21 we can notice a lag between changes in the real economic situation and balance of migration. This lag reflects expectations of upcoming economic downturns. If we shift the balance of migration one year back, the correlation becomes even more evident.

Figure 22. Correlation between change in real GDP and lagged balance of migration (-1 year)



Source: Own construction based on Committee on Statistics under the Ministry of National Economy of the Republic of Kazakhstan data

In this case the correlation coefficient is equal to 79% as opposed to 73% in the previous case. These calculations are based on Committee on Statistics under the Ministry of National Economy of the Republic of Kazakhstan data.

Figures 21 and 22 above, once again reconfirm that in recent years, economic reasons were the main cause of migration processes in the country. Moreover, the previous Figure 22 shows that in situations when economic problems are expected, oil companies' managers try to cut costs in advance. Migrant workforce and service contracts are usually the first to suffer in such situations.

The number of real refugees, i.e. those who have been forced to flee his or her country because of persecution, war, or violence, in the country is very small. As per the information of UNHCR (2017) "As of 1 July 2016, 653 men, women and children have been recognized as refugees on an individual basis by the State under the 1951 Convention and the national Refugee Law.

Kazakhstan also continues receiving asylum-seekers primarily from Afghanistan and Syria, and very few from other countries. The majority of refugees have been residing in Kazakhstan for over ten years."

Migration processes in the western oil-producing regions

The western regions of Kazakhstan include Aqtobe, Atyrau, Mangghystau and West Kazakhstan regions of the country. The political and administrative map of the country is given in the Attachment 1 below.

These migration processes in western oil-producing regions occur in the following forms:

- Intra-regional rural-to-urban migration;
- In-country migration. It includes (i) resettlement of people from other regions of Kazakhstan to the western oil-producing regions, (ii) a flow of shift employees mostly working for oil and oil service companies and (iii) resettlement of western regions residents to the country capital Astana and the country's biggest city Almaty;
- Immigration. It mostly includes labor immigration, both official attraction of foreign labor and uncontrolled illegal labor migration, mainly from the neighboring countries;
- Emigration. Very active in the 90's, this process is again on the rise since the beginning of the oil price plunge.

Being by far the biggest driver of the Kazakh economy, the oil industry affects migration processes in Kazakhstan significantly. This is especially true for Western Kazakhstan where the labor market is dominated by the oil industry.

Another important point is that the oil sector offers job opportunities not only in production and exploration of oil, but also in connected services such as construction, machine-building, transportation, security, etc. In Kazakhstan low oil prices lead to oil production decrease and this in its turn leads to curtailing costs, investments and connected companies downsizing.

During the last 5 years, foreign professionals working in Western Kazakhstan constituted the lion's share of the total number of foreign employees in Kazakhstan. For example, the Atyrau region attracted 30% and the Mangghystau region 12.2% of all foreign labor forces officially working in the country Sadovskaya (2014). With another West Kazakhstan region where the super-giant Karachaganak oil and gas field is situated, they received more than half of the work permits issued in Kazakhstan. The main reasons for this are the availability of well-paid jobs and the lack of qualified personnel. These jobs also encourage resettlement of people from other regions of Kazakhstan. Another way of migration observed is a flow of shift employees working for oil and oil service companies. By way of illustration, we can advise that the intensity of migration in the Mangghystau region was 15.7 per 1,000 people whereas for the entire country this figure had a value of 0.7 per 1,000 people Yessimkhanova (2014). In general, the higher the gross regional product per capita is, the higher is the balance of migration.

The maximum number of work permits obtained by foreign labor force was observed in 2007. The process was interrupted by the financial crisis of 2008 and has remained almost flat since 2012. It is worth pointing out that in July 2010 Belarus, Kazakhstan and Russian Federation established the Customs Union (CU). According to CU rules, migrant workers from any CU member country are exempted from the need to obtain work permits. This circumstance substantially contributed to the decrease in the number of issued work permits. So, now it is more difficult to compare the current statistics with the statistics for previous years as the methodology changed.

The crisis affected the migration processes very seriously. Even though the number of official migrants possessing work permits remains almost the same, the number of in-country and illegal migrants decreased substantially. There is no official data for illegal migration. However, according to Kazakh government estimates based on Committee on Statistics under the Ministry of

National Economy of the Republic of Kazakhstan data, the number of illegal migrants decreased by three-fold since the end of 2014. These estimations are shared by oil industry sources. This happens because people receiving work permits are usually skilled well-paid professionals always employed officially and often having long-term contracts. This is obviously not the case for illegal migrants. Nevertheless, the positive balance of inter-regional migration was observed in the cities of Astana and Almaty and also in the western regions of the country Ministry of National Economy of the Republic of Kazakhstan (2015).

Relations between migrants and the local population

Talking about the effect of the oil price plunge on migration processes in Kazakhstan we should not omit one significant factor – as the author mentioned before, the relations between the local population and migrants in the oil producing regions of the country are traditionally strained. One of the first social unrests in the former Soviet Union took place in the oil-producing Mangghystau region of Kazakhstan in 1989. In 2004–2006 numerous clashes between Kazakh and Turkish workers turned violent. These riots occurred within a secure industrial enclave of the super-giant Tengiz oil field in the Atyrau region. Kazakhs-repatriates (oralmans) from neighboring Turkmenistan and Uzbekistan were one of the major driving forces of many social unrests. The examples given above demonstrate that the situation is very serious and produced numerous conflicts even during the periods of high oil prices.

There were concerns that the economic crisis caused by low oil prices can aggravate the situation further. However, the good news is that the number of conflicts between the local population and the foreign labor force has decreased. The main reason for this is the outflow of the foreign labor force since the beginning of the oil price plunge.

Oil producing western regions demonstrate the highest birth rate in the country. In 2015, the birthrate in the Mangghystau region was 31.25 per 1000 inhabitants as opposed to 14.23 in the North-Kazakhstan region where the lowest birthrate is observed with the country average of 22.66.

Potential negative consequences of the last oil price plunge for migration and governmental mitigation measures

In the table below the author tries to summarize the negative consequences of the oil plunge for migration processes and mitigation measures that could be taken by the Kazakh government.

Table 6. Consequences of the oil price plunge and potential mitigation measures

No	Existing or Possible Consequences	Potential Mitigation Measures
1.	Growth of unemployment resulting in deterioration of living standards and worsening of criminal situation	Promotion of small and medium businesses, improvement of investment climate, implementation of state-funded infrastructure projects, vocational training programs, special assistance projects and public awareness campaigns.
2.	Growth of social tensions in oil-producing regions of Kazakhstan	
3.	Growth of tensions between the local population and ethnic repatriates (oralman) This was already noticed by Kourmanova (2012) and Kuşçu (2014).	
4.	Brain drain in the form of emigration of the most educated and skilled portion of the population.	This consequence is probably the most difficult to deal with. The usual responses to it are the creation of new well paid jobs and fighting corruption, but these actions are very difficult to implement.
5.	Crisis of single-industry cities[19] relying on oil industry as a main source income (Zhanaozen, Kulsary, Aksay).	In addition to the measures mentioned in points 1, 2 and 3 above, the implementation of the State Development Program for Single-Industry Cities

[19] Single-industry cities of Kazakhstan are the cities where a substantial portion of the working population is employed by one or more city-forming enterprises. These enterprises are usually of the same industry and determine virtually all economic and social processes taking place in such a city. Currently, the developers of the State Development Program for Single-Industry Cities of Kazakhstan use the following classification: a city is considered a single-industry one if more than 20% of the production volume of this city is produced by one enterprise or more than 20% of the working population of this city is employed by this enterprise.

In any case, we have to be ready to a scenario when oil prices will go further down and this scenario will continue over the mid-term. This scenario implies further worsening of the socio-economic situation in general and the situation with migration processes in particular.

Conclusion

The migration situation in Kazakhstan, which has one the biggest share of migrant population in the world, has been seriously affected by the last oil price plunge. The periods of low oil prices take dramatic toll on the Kazakh economy and this inevitably affects the social sphere in general and migration situation in particular. As per the opinion of the World Bank Group (2015) "A difficult external environment will continue to affect Kazakhstan's medium-term outlook". Taking into consideration the dependence between changes in the real GDP and the balance of migration, which was noted by many researchers and the Kazakh government agencies, urgent and well thought-over measures are required to tackle the negative economic consequences in the sphere of migration. This document is an attempt to describe and analyze the situation and to propose potential mitigation measures, which can improve the migration situation and more generally the situation in social sphere in the western oil-producing regions of Kazakhstan.

7. Econometric model

7.1. Introduction

Having crude oil as its main export commodity, Kazakhstan is highly dependent on oil price fluctuations. The objective of this chapter is to study how Kazakh macroeconomic indicators react to these fluctuations. Numerous attempts to explain the influence of oil price fluctuations on main macroeconomic indicators have been undertaken in the past. Much fewer scientific papers studied this influence in the Kazakhstan environment. The main differences with the previous works is that the current dissertation considers the time period after the beginning of the last oil price slump (June 2014) and takes into consideration the data from 2003, which is more correct methodologically.

As stated by Ekong and Ebong (2016) "The impacts of crude oil price shocks on economic variables have been a controversial but interesting topic globally over the past years. Controversial in the sense that, different and divergent results have been obtained amidst the dire need to curb the negative results of these oil price shocks on the economy. Many questions are being raised concerning the direct and indirect relationship between these variables. In an effort to unravel this, many researchers have used several measures in different dimensions to study this trend. All of which boil down to the fact that the impact of the oil price shocks varies from economy to economy depending on whether the economy is an importer of oil or an exporter of oil. As asserted by Marzieh (2006) the magnitude of the direct effect of a given oil price increase depends on the share of the cost of oil in national income, the degree of dependence on imported oil and the ability of end-users to reduce their consumption and switch away from oil. For Nigerian economy, having oil as its main stay, the price of oil significantly shapes the economic status of the country." This is equally right for the Kazakh economy, having oil as one of

its main sources of budget revenues. As well demonstrated in this dissertation, the Kazakh economy is fully exposed to major crude oil price distortions.

Gronwald et al (2009) applied a VAR model in order to investigate the macroeconomic consequences of negative oil price shocks. They found that "all variables under consideration in the VAR model – GDP, inflation, budget revenue, exports, and the real exchange rate - exhibit a significantly negative response to oil price declines". Another significant result of their paper is that "a standard linear VAR model is appropriate for capturing the Kazakh oil-macro relationship. This last result is of particular importance as the oil-macro relationship for major economies such as the U.S. has found to be non-linear." The same approach (standard linear VAR model) is applied in this dissertation.

7.2. Sources of data

Main macroeconomic indicators: the Committee on Statistics under the Ministry of National Economy, the National (Central) Bank of the Republic of Kazakhstan and the World Bank

Oil price: Bloomberg markets.

Quarterly data from 2003 to 2016 have been used in this research. As mentioned above, the earlier data are not considered because the country joined the International Monetary Fund's Special Data Dissemination Standard (SDDS) in 2003 and in order to achieve this, the country amended some methodologies of data collection and processing. The data for 2017 are not yet available in full.

7.3. Software used

Gretl - open-source statistical package used mainly for econometric calculations. Unfortunately, this statistical package does not allow to provide graphics of better quality.

7.4. Data and their abbreviations

This chapter considers the influence of oil price changes on such macroeconomic variables as inflation, government revenues and exports. The

bigger number of macroeconomic variables requires the longer time series, which is not possible now. Also, the author has tried to avoid collinearity of considered variables.

1. Oil price – Brent crude oil price, US$/bbl - l_Oilprice
2. CPI – Consumer price index used to measure inflation - l_CPI
3. Govrev – Government Revenues, KZT[20] million - l_Govrev
4. Export - Export, US$ million - l_Export

All data are in logarithmic form.

Figure 23. Graphic representation of the variables

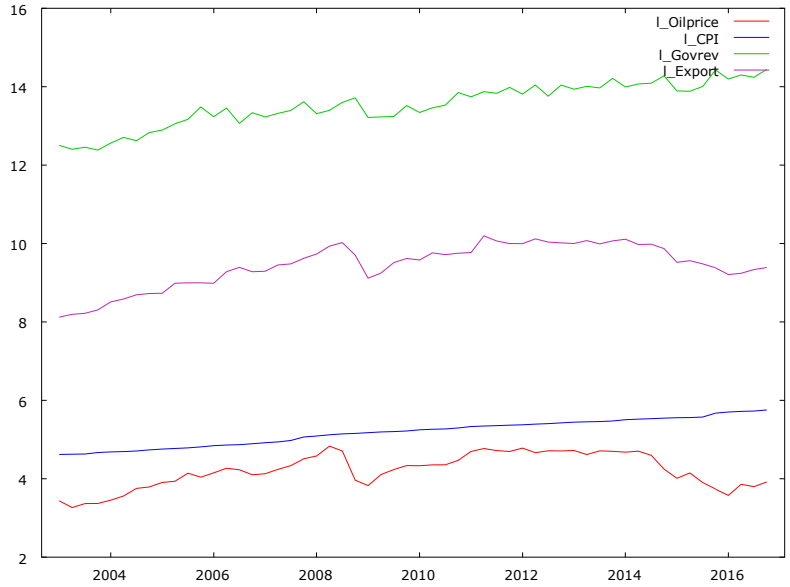


Figure 23 above shows time plots of the selected variables over the considered period of time. Expectedly there is a direct correlation between the oil price and export plots. Government revenues also demonstrate less visible, but existing correlation with the oil price. Consumer price index is less dependent on oil price movements though has the same upward trend.

First there is a need to run unit root tests to understand whether time series variables under consideration are non-stationary and possess a unit root.

[20] KZT - Kazakhstan national currency tenge

The null hypothesis is generally defined as the presence of a unit root. The Augmented Dickey Fuller (ADF) test was used for this purpose testing down from 10 lags. Criterion used: AIC - Akaike information criterion

Model: (1-L)y = b0 + b1*t + (a-1)*y(-1) + ... + e

Table 7. ADF unit root test results

Level				First order difference			
Variables	Lag	t-statistic	P-value	Variables	Lag	t-statistic	P-value
l_Oilprice	1	-2.62388	0.08808	d_l_Oilprice	1	-5.4144	2.686e-006
l_CPI	0	-0.176137	0.935	d_l_CPI	0	-6.16447	2.337e-006
l_Govrev	5	-1.57535	0.4952	d_l_Govrev	6	-3.44168	0.00965
l_Export	1	-2.48628	0.1188	d_l_Export	1	-5.67885	6.822e-007

d_ is the first order difference operator.

Based on this test, it is possible to say that the selected time series become stationary in the first difference form. So first order differences of the selected variables will be used further. The same approach was applied by Kose and Baimaganbetov (2015).

7.5. Lag selection

The lag order was selected using AIC. I started with the lag order 8 recommended by Gretl, the program I used.

Table 8. Calculation of information criteria for lag order 8

```
VAR system, maximum lag order 8

The asterisks below indicate the best (that is, minimized) values
of the respective information criteria, AIC = Akaike criterion,
BIC = Schwarz Bayesian criterion and HQC = Hannan-Quinn criterion.

lags        loglik    p(LR)       AIC          BIC          HQC

   1     227.46401            -8.828256    -8.040959*   -8.531991*
   2     245.40385  0.00301   -8.910802*   -7.493668    -8.377525
   3     259.64695  0.02764   -8.836040    -6.789068    -8.065751
   4     272.10331  0.07138   -8.685247    -6.008438    -7.677946
   5     290.78116  0.00187   -8.799198    -5.492551    -7.554885
```

```
   6     297.56932  0.63024   -8.407205    -4.470721    -6.925880
   7     318.68912  0.00036   -8.625069    -4.058747    -6.906731
   8     341.14690  0.00014   -8.899868    -3.703709    -6.944519
```

Then I tried the lag order 4 usually recommended for quarterly data.

Table 9. Calculation of information criteria for lag order 4

```
VAR system, maximum lag order 4

The asterisks below indicate the best (that is, minimized) values
of the respective information criteria, AIC = Akaike criterion,
BIC = Schwarz Bayesian criterion and HQC = Hannan-Quinn criterion.

lags        loglik    p(LR)       AIC          BIC          HQC

   1     248.57173            -8.963597*   -8.206018*   -8.674104*
   2     263.85960  0.01524   -8.935671    -7.572029    -8.414583
   3     279.17307  0.01501   -8.908748    -6.939043    -8.156065
   4     290.04980  0.15133   -8.707835    -6.132068    -7.723558
```

I also tried the lag order 2 used by Gronwald et al (2009)

Table 10. Calculation of information criteria for lag order 2

```
VAR system, maximum lag order 2

The asterisks below indicate the best (that is, minimized) values
of the respective information criteria, AIC = Akaike criterion,
BIC = Schwarz Bayesian criterion and HQC = Hannan-Quinn criterion.

lags        loglik    p(LR)       AIC          BIC          HQC

   1     257.05583            -8.945503*   -8.201997*   -8.659586*
   2     270.63109  0.03984   -8.854003    -7.515692    -8.339353
```

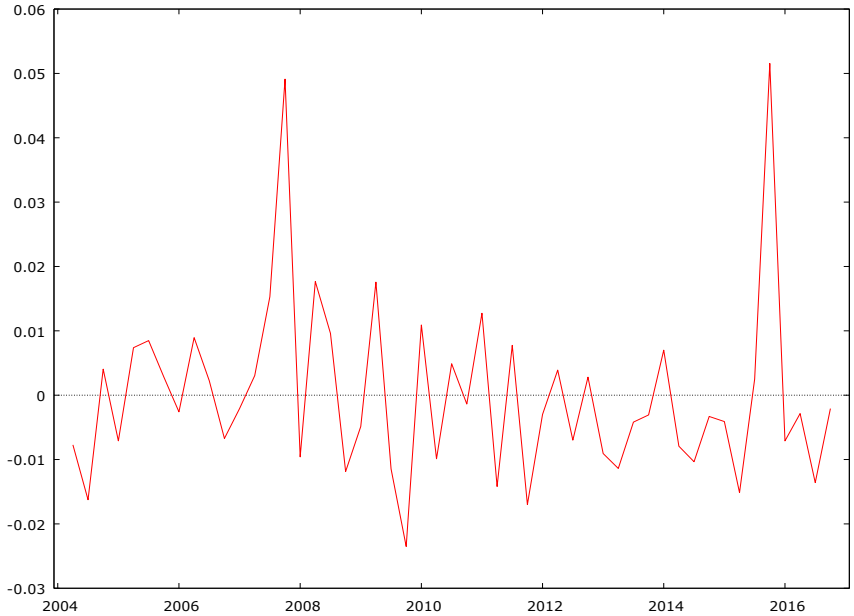
All the information criteria are better for the lag order 4. So, lag order 4 will be used further.

7.6. VAR system calculation

During the initial calculation of this VAR model, the Doornik-Hansen test for normality of residuals showed the p-value less than 5%. This means that the VAR is not normally distributed. So there was a need to test the normality of residuals for each series to understand which one is causing problems. For this purpose I saved residuals for every equation and tested the

normality of each residual. According to the results received, I rejected the normality of the residuals of the second equation (for Consumer Price Index) as having the p-value less than 5%.

Figure 24. Residuals plot the second equation (Inflation)



A residual plot is a graph that shows the residuals on the vertical axis and the independent variable on the horizontal axis. Also in regression analysis, the difference between the observed value of the dependent variable (y) and the predicted value (ŷ) is called the residual (e). Each data point has one residual.

Residual = Observed value - Predicted value $e = y - \hat{y}$

Both the sum and the mean of the residuals are equal to zero. That is, $\Sigma e = 0$ and $e = 0$."

There are two outliers on this plot. This is why there is a need to include two dummy variables to account for this outliers. I included dummies for the 4th quarter 2007 and 4th quarters 2015 and tested the normality of residuals again. The 1st dummy is conditioned by the economic and financial crisis, which was particularly intense in the country at this time. The 2nd dummy is

caused by “The move to a floating exchange-rate regime in August 2015 led to a steep depreciation of the Kazakhstani tenge (KZT) and a steep increase in the inflation rate”.[21]

After the inclusion of two dummies, the VAR model under consideration became normally distributed.

Results of all the calculations are given in the attachments below:

- Attachment 2. First calculation of the VAR model (without dummies)
- Attachment 3. Tests for the first calculation of the VAR model
- Attachment 4. Second calculation of the VAR model (with dummies)
- Attachment 5. Tests for the second calculation of the VAR model

7.7. Analysis of the model

As mentioned in “Introduction to Modern Time Series Analysis” Kirchgässner et al (2013) “Contrary to the parsimony principle applied in the univariate analysis, the VAR(p) models are over-parameterised systems. The individual parameters can hardly be interpreted meaningfully. For this reason, other methods, like Granger causality tests, impulse response analyses and variance decompositions, are employed.”

In Gretl, the Granger causality test is automatically performed for each variable in the system – F test. And its results are as expected because changes in Kazakh macroeconomic indicators are caused by changes in oil price and not *vice versa*.

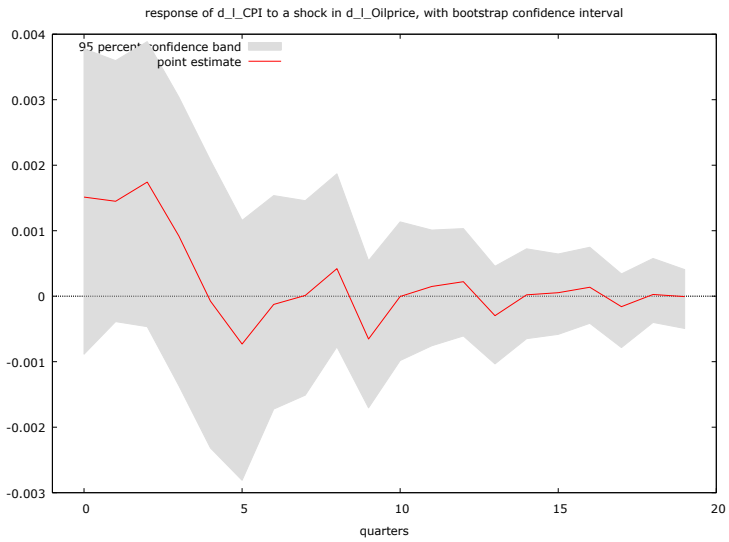
Impulse responses (reactions of any dynamic system in response to some external change) of macroeconomic indicators to oil price changes shown on plots below and demonstrate clear dependence of considered macroeconomic indicators on oil price movements. In this case, I made several comparisons with the work by Gronwald et al (2009), but please take into

[21] http://www.worldbank.org/en/country/kazakhstan/publication/economic-update-summer-2016

consideration that unlike the current dissertation, which considers 10% increase in oil prices, they are considering the decline of 10%.

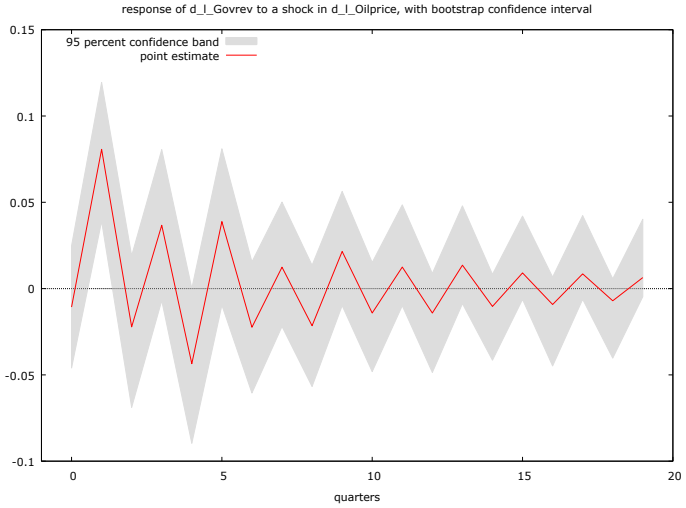
The vertical axes on the figures below show deviation and horizontal axes quarters. 20 quarters shown on horizontal axes correspond to 5 years.

Figure 25. Impulse response of inflation to a shock in oil price



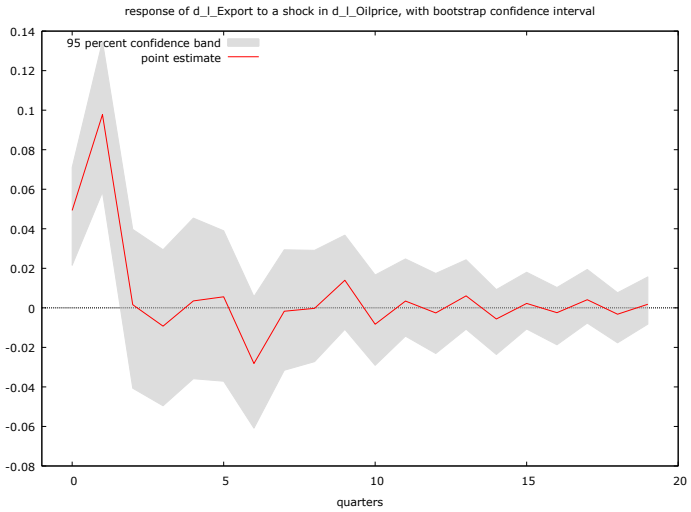
The impact of an oil price shock on inflation (CPI difference) reaches its peak at the 2nd quarter and a relaxation of the effect arises after about 8 quarters. The result received by Gronwald et al (2009) is different. In their work "the peak emerges after 3 quarters and it vanishes after about 8 quarters already." That means that the degree of dependence of inflation in Kazakhstan on oil price movements has become even bigger since 2009.

Figure 26. Impulse response of government revenues to a shock in oil price



The peak of impact of the oil price shock on government revenues arises in the 1st quarter and the impact remains substantial until the 5th quarter vanishing soon after. Already the 6th quarter can be considered as the beginning of this process. This is slightly different from the results obtained by Gronwald et al (2009) – 3rd and 5th quarters respectively. This is explained by improvements made to the mechanism of transfers to the National Fund after the global financial crisis.

Figure 27. Impulse response of export to a shock in oil price



The relationship between oil prices and the volume of exports is shown on the plot above. Given that the share of oil in total exports is about 60%, the estimated response is reasonable (a 10% increase in prices leads to about 5% increase in the value of exports). Please note that direct relation in this case is impossible, because a substantial share of oil is exported through long-term contracts or by companies of oil-importing countries.

Forecast error variance decompositions demonstrates the contribution of each type of shock to the forecast error variance. It is useful in assessing how shocks to economic variables reverberate through a system. The results are presented in the table and graph forms in the Attachments 8 and 9 respectively, but their analysis lies beyond the scope of this dissertation.

7.8. Conclusion

The influence of oil price movements on economies of different countries attracts a serious academic attention. Another attempt to look at oil-macro relationship is presented in this dissertation. It uses vector autoregressive model, the most suitable and the most used for this type of research, as already been described in the Literature Review section. The main results received through this econometric model reconfirm earlier researches (already described above in the Literature review and the Introduction to this chapter) with some degree of discrepancy stipulated mostly by different timeframes – none of earlier researches targeted Kazakh macroeconomic variables during the period after the beginning of the last negative oil price shock, which started in June 2014. So the macroeconomic variables considered in this chapter demonstrate significant negative response to oil price declines and *vice versa*. Another conclusion is the timing during which the impact of oil price shocks is really substantial. For the macroeconomic indicators under consideration, this impact reaches its peak at the 1st or 2nd quarter and a relaxation of its effect takes place before 8 quarters. This knowledge has important implications for the Kazakh government planning process.

8. Scenario analysis

Having considered the influence of oil price plunges on the selected Kazakh macroeconomic indicators, there is a need to look at potential situation developments and factors, which will affect them. For this reason, the scenario analysis approach is employed.

The recent slump in the price of crude oil once again jeopardized the economic stability of oil-exporting countries forcing them to look for ways out of the current situation and prevent economic downturns in the future. In this chapter the author makes an attempt to look at the situation in the Republic of Kazakhstan in a structured way considering alternative possible outcomes of different scenarios and identify potential problems in order to increase preparedness for solving them. Recommendations are presented in the next chapter.

As rightly mentioned by Kose and Baimaganbetov (2015) "…higher oil prices have adverse effects on economic performance of oil-exporting countries. Because they change the structure of the economy in favor of the non-traded sectors and against the traded manufacturing and agriculture sectors. In addition, higher oil revenues during an oil boom will lead to an appreciation of the local currency and increasing imports of intermediate and consumer goods. The heavy reliance of oil-exporting developing economies on imports will in turn harm domestic industries as they cannot compete with imported goods when oil prices are high and cannot sustain their production levels when oil prices and imports decline." This is why it is so important to perform the thorough analysis of possible situation developments and to take the strategic decision, which will minimize the Kazakhstan's dependence on oil exports proceeds.

"Scenario analysis is a process of analyzing possible future events by considering alternative possible outcomes (scenarios). The analysis is designed to allow improved decision-making by allowing more complete consideration

of outcomes and their implications. This is an important tool used extensively to make projections for the future."[22]

It is essential to point out that scenarios make no claim to make precise predictions. Scenarios in this sense depict only possible futures. Considering different scenarios, it is imperative to take into account their ultimate goal – to ensure better preparedness to the future minimizing negative consequences of the chosen scenario.

8.1. Scenarios under consideration

The following three scenarios are considered in this dissertation:

Scenario 1 or low-price scenario. Under this scenario the oil prices range is within US$20 to US$50 per barrel for the next 5 years. The situation with oil prices lower than US$20 per barrel does not look realistic though oil prices can cross this line occasionally.

Scenario 2 or medium-price scenario. Oil prices are in the range from US$50 to US$80 a barrel.

Scenario 3 or high-price scenario. Oil prices grow higher than US$80 per barrel.

Please note that oil price can from time to time exceed the limits given above. This does not mean that there is a need to consider another scenario immediately. Considering another scenario should be undertaken only in certain cases when the oil price will stay in another price range for a considerable period of time.

8.2. Assignment of probabilities to each scenario

Assigning probabilities to these scenarios is difficult as the situation is obviously very uncertain and dynamic. This exercise was carried out in the middle of 2017 through interviewing 30 industry experts. Each of them received a request to assign probabilities per the form given in Table 11 below.

[22] http://www.investordictionary.com/definition/scenario-analysis

22 replies were received. 2 experts out of 22 declined to comment. The remaining 20 agreed to the probabilities distribution shown in Table 11. So, Scenario 2 was chosen as the most probable scenario.

As already mentioned above, we should not underestimate the uncertainty of the oil market, which has many times shown that most of expectations regarding it behavior appear to be wrong.

Table 11. Scenario probabilities for 2018-2021

Scenario	Probability, %
Scenario 1 or low-price scenario (US$20 to US$50 per barrel)	20
Scenario 2 or medium-price scenario (US$50 to US$80 per barrel)	50
Scenario 3 or high-price scenario (higher than US$80 per barrel)	30

8.3. Potential outcomes for each scenario

Scenario 1: In the short run, major economic and social indicators of the country continue to deteriorate. This scenario will result in lower economic activity and government revenues, higher inflation and unemployment, lower population incomes and, as a consequence, the absence of fundamental factors for expanding aggregate demand, decreasing investments, etc. The main risks in this scenario are potential economic crisis aggravated by growing social discontent. The government will have to put a lot of efforts into improving the situation with weak chances for success. However, the medium- and especially long-term outlook are much more promising preparing the country to the life without oil revenues. The economic difficulties of today make the country better prepared for future changes and allow to avoid even worse consequences.

Scenario 2: The economic situation in the country improves slowly. Certain increase in government revenues will be offset by earlier depletion of financial and other reserves happened after the beginning of the oil price plunge. In the short run, the main risk of this scenario is a potential decrease of oil price,

which can derail all government's efforts to improve the socio-economic situation in the country. At the same time, this scenario can provide a gradual transition to the non-oil economy without serious deterioration of the population's living standards. The difficult part of this scenario is that it tempts the government to continue the previous economic policy, which already proved its ineffectiveness.

Scenario 3: A lot in this scenario is depending on the price range. Obviously, the economic situation will be different at the oil price of US$80 per barrel and US$100 per barrel. However, in general the economy will be improving with the speed depending on the oil price. In case of substantial increase, the Kazakh economy can return to the pre-crisis situation. The main risks of this scenario are (i) a potential decrease of oil price in the short-term and (ii) the country remains unprepared to future oil plunges and potential end of oil era. Even though at first glance high oil prices bring the economic prosperity, the fact is that they just postpone urgent government reforms aimed at eliminating the dependence on oil proceeds.

8.4. Pugh matrix

The Pugh matrix technique (also called the grid analysis or decision matrix) is built upon weighing different factors, which affect the situation. It is used to evaluate and choose between several alternatives. It is applied for making a choice in the situations where many factors must be taken into account. The matrix will help to understand and analyze the situation and to see how will develop and to which outcomes the country will come. For the purpose of this dissertation, the Pugh matrix is applied to understand which oil price scenario brings better results in the end. It is also important that this matrix allows for a simple sensitivity analysis to be performed. As the preparation of Pugh matrixes is a team-based procedure, the exercise was conducted with the help of two Kazakh government employees, who formed a team with the author. Based on their experience they helped to compile

potential outcomes for each scenario, the lists of consequences and to assign points to each of it under each scenario. The most valuable part of their participation in this exercise is their experience and the knowledge of specific procedures employed when strategic decisions are taken. This work started with the compilation of the Initial Pugh matrix (Table 12 below) and assigning points to each consequence. Then the Initial matrix was converted into other matrixes shown below.

Based on the work done in this dissertation and upon consultations with the above-mentioned governmental employees, it was decided to start the exercise with the traditional three pillars of sustainability, namely economic viability, environmental protection and social sustainability. All the consequences are divided into short-, medium and long-term because this approach helps to better understand the situation and its potential developments. Short-term in this context means for the period up to 5 years, medium-term means the period from 5 to 15 years and long-term means the period exceeding 15 years. The assignment of points was done in a usual straightforward way without giving weight to any point. The initial matrix is presented in Table 12 below.

Table 12. Initial Pugh matrix

			Scenario 1 (low-price)		Scenario 2 (medium-price)		Scenario 3 (high-price)	
Consequences	Weight	Max Possible Points	Points	Weighted Points	Points	Weighted Points	Points	Weighted Points
Short-term economic	1	5	1	1	3	3	5	5
Medium-term economic	1	5	2	2	3	3	4	4
Long-term economic	1	5	4	4	3	3	2	2
Short-term environmental	1	5	1	1	2	2	3	3

Medium-term environmental	1	5	3	3	2	2	1	1
Long-term environmental	1	5	4	4	2	2	1	1
Short-term social	1	5	1	1	2	2	3	3
Medium-term social	1	5	2	2	2	2	2	2
Long-term social	1	5	4	4	2	2	1	1
Total		**45**		**22**		**21**		**22**

Explanations to the points assigned:

Economic consequences: Expectedly low oil prices negatively affect the country's short-term economic outlook and vice versa. This is the reason why points 1, 3 and 5 were assigned to low-, medium- and high-price scenarios respectively. With regard to the long-term outlook, the consensus was that even though the low oil prices will help to reduce the dependence on oil revenues, promote the development of non-oil sectors and result in a better overall performance, there is a certain pessimism over the country's ability to adapt to the low oil price environment, which resulted in assigning 4 points to the low oil price scenario as opposed to 5 points of short-term considerations of high price scenario. Similarly, the high prices cannot be considered in a negative way only as they constitute a very significant source of government revenues. This was reflected in assigning 2 points. Henceforward, the medium-term outlook occupied an in-between position.

Environmental consequences: In the short-term, low oil prices will result in smaller government revenues and oil companies' profits. It means that there will be less financing for environmental activities. In the longer run, low prices will result in curtailing oil production and less environmental degradation.

Social consequences: These consequences are very similar to the environmental ones. In the short-term, low oil prices will result in smaller government revenues and oil companies' profits. That means that there will be less financing for social activities. In the longer run, low prices will result in better preparedness of the country and its population to the life without oil revenues.

Summary: The application of this straightforward approach results in almost the same results for every scenario. In this case, the government does not see any reason for adapting the country for future changes because disadvantages and advantages are basically counterbalanced.

It is interesting to see what happens if we will take into account short-term consequences only. The matrix will look this way:

Table 13. Reduced Pugh matrix

			Scenario 1 (low-price)		Scenario 2 (medium-price)		Scenario 3 (high-price)	
Consequences	Weight	Max Possible Points	Points	Weighted Points	Points	Weighted Points	Points	Weighted Points
Short-term economic	1	5	1	1	3	3	5	5
Short-term environmental	1	5	1	1	2	2	3	3
Short-term social	1	5	1	1	2	2	3	3
Total		**15**		**3**		**7**		**11**

This is a good illustration to why most of OECs come to oil price slumps unprepared.

The government employees also suggested to include the following consequences:

1. Political as this factor is playing a very substantial role for the country's development; and

2. The development of education, science and technology (DEST). The reason is that DEST has been declared a national priority.

They advised that the inclusion of these two factors into consideration will significantly increase the interest of high-level government employees in this work. The result is shown in Table 14 below.

Table 14. Expanded Pugh matrix

			Scenario 1 (low-price)		Scenario 2 (medium-price)		Scenario 3 (high-price)	
Consequences	Weight	Max Possible Points	Points	Weighted Points	Points	Weighted Points	Points	Weighted Points
Short-term economic	1	5	1	1	3	3	5	5
Medium-term economic	1	5	2	2	3	3	4	4
Long-term economic	1	5	4	4	3	3	2	2
Short-term environmental	1	5	1	1	2	2	3	3
Medium-term environmental	1	5	2	2	2	2	2	2
Long-term environmental	1	5	4	4	2	2	1	1
Short-term social	1	5	1	1	2	2	3	3
Medium-term social	1	5	2	2	3	3	2	2
Long-term social	1	5	4	4	2	2	1	1
Short-term political	1	5	2	2	3	3	5	5
Medium-term political	1	5	3	3	3	3	4	4
Long-term political	1	5	4	4	3	3	2	2
Short-term DEST	1	5	2	2	3	3	3	3

Medium-term DEST	1	5	3	3	2	2	2	2
Long-term DEST	1	5	4	4	3	3	2	2
Total		**75**		**39**		**39**		**41**

Explanations to the points assigned:

Political consequences: Low oil prices negatively, but not dramatically affect the points assigned under short-term Scenario 1 and expectedly positively affect the Scenario 3 because the substantial inflow of budget revenues in the periods of high prices enables the government to follow less stringent social policies. However, in the long run, accepting the low oil price scenario as a basic one allows the government to avoid potential crises caused by negative oil price shocks.

DEST consequences: in the short run, the high oil prices provide more financing for the development of education, science and technology. However, in the long run, the decrease of oil revenues creates more enabling environment for DEST.

Summary: The results are very similar to those shown above. Moreover, the high oil price scenario received slightly more points. This happened because of inclusion of political consequences. Again, the government does not see any reason for adapting the country for future changes and as often happens in OECs short-term political considerations prevail.

The situation changes completely if we prioritize the consequences assigning bigger weights to medium and long term ones (2 and 3 respectively). The findings clearly show that in the long run the low oil price environment enables Kazakhstan to develop in a more sustainable way.

Table 15. Expanded matrix with differentiated weights

			Scenario 1 (low-price)	Scenario 2 (medium-price)	Scenario 3 (high-price)

Consequences	Weight	Max Possible Points	Points	Weighted Points	Points	Weighted Points	Points	Weighted Points
Short-term economic	1	5	1	1	3	3	5	5
Medium-term economic	2	10	2	4	3	6	4	8
Long-term economic	3	15	4	12	3	9	2	6
Short-term environmental	1	5	1	1	2	2	3	3
Medium-term environmental	2	10	2	4	2	4	2	4
Long-term environmental	3	15	4	12	2	6	1	3
Short-term social	1	5	1	1	2	2	3	3
Medium-term social	2	10	2	4	3	6	2	4
Long-term social	3	15	4	12	2	6	1	3
Short-term political	1	5	2	2	3	3	5	5
Medium-term political	2	10	3	6	3	6	4	8
Long-term political	3	15	4	12	3	9	2	6
Short-term DEST	1	5	2	2	3	3	3	3
Medium-term DEST	2	10	3	6	2	4	2	4
Long-term DEST	3	15	4	12	3	9	2	6
Total		**150**		**91**		**78**		**71**

8.5. Conclusion

The results received through the scenario analysis exercise much better reflect the need to achieve the ultimate goal of this scenario analysis – to ensure

the better preparedness to the long-term, sustainable, well-balanced development of the country minimizing potential negative consequences. The results clearly show that the Kazakh government should adopt the low oil price scenario as the main one to make the country better adapted for future changes in the long run. The optimal and partly implemented solution in this case is the development as if there is no oil revenues in the country. Obviously, the medium price scenario has the larger probability and it is obvious that the results received in this chapter do not mean that there is a need to loose opportunities provided by the periods of high oil prices. Understanding consequences of each scenario will help the Kazakh government in economic and financial planning. The optimal and well-proven solution is the accumulation of oil revenues in the National Fund while creating an enabling environment for SME development, FDIs and pursuing very strict financial policy, which rules out any attempt to use oil revenues for financing current government expenses or mismanagement of these revenues. These matters will be developed in more details in the next chapters.

Finishing this chapter it is essential to reiterate one more time that the oil era will not last forever. It is imperative to make the country fully ready for future changes. This is why it is of utmost importance to be fully committed to sustainability as the country's main development priority assigning greater importance to medium and long term consequences. Failing this will result in the unpreparedness to future crises, not necessarily caused by oil price plunges.

9. Analysis of potential mitigation measures

9.1. Introduction

Having considered the influence of oil price fluctuations on the Kazakh economy, potential situation developments and factors, which would affect these developments, it is suggested to look at potential mitigation measures for overcoming negative consequences of oil price plunges.

This chapter initially addresses the general international experience of OECs on overcoming negative consequences of oil price plunges and then examines the measures taken by the Kazakh government.

Obviously, OECs are very diverse with different economic structure, level of dependence on oil revenues, etc., but this commodity usually plays a very important role in economy of every oil-exporting country and these countries are usually dependent on oil export revenues heavily. These countries use very similar strategies for overcoming negative consequences of oil price plunges, however the results these countries achieve vary substantially.

Such problems are generally typical for raw materials export economic models as "natural resource abundant countries systematically failed to achieve strong export led growth or other kinds of growth." (Sachs and Warner, 2001). Similarly, the strategies used for overcoming negative consequences of low prices on export commodities largely failed.

Keeping in mind the pace, with which non-conventional sources of energy are replacing conventional ones, we can assume that development strategies based on export of energy resources in general and crude oil in particular are not long-standing. Also environmental concerns are playing an increasing role in the modern world and do not favor oil as one of the main polluters. These are another strong arguments for modernization of OECs economies.

In such major oil exporting countries like Saudi Arabia, Russia, Iraq, United Arab Emirates, Nigeria, Kuwait, Angola, Venezuela, Kazakhstan, Iran

and some others, governments remain the main engine of economies, the main employer and the main sponsor of infrastructural, industrial and other projects. This actually means that wide circles of population and private businesses in these countries depend heavily on oil revenues.

Obviously low oil prices provide some positive effects for OECs. They (i) include expulsion from the energy market or limiting the development of non-conventional energy producers (renewables, shale oil, etc.) and (ii) benefits for non-oil sectors from lower energy prices, etc. However, the negative effects far outweigh positive ones.

It is interesting to consider what determines successes and failures in overcoming negative consequences of oil price plunges because the problem is how oil-exporting countries should react to different consequences of the oil price plunge. To resolve this problem, the oil-exporting countries develop special response measures.

9.2. Main measures used by OECs' governments to mitigate negative consequences

Based on the vast body of scientific and other economic[23] literature on this subject, the measures used by OECs' governments to protect themselves from oil price declines can be summarized as follows below.

9.2.1. Financial and fiscal policy adjustments

In the times of low oil prices, significant financial and fiscal policy adjustments take place in all oil-exporting countries and considered as mandatory. Because of this, there are suggestions to introduce rules-based countercyclical policies Kumhof and Laxton (2013). "Budget-balance rules with countercyclical responses to both the non-oil tax gaps and oil royalty gaps are found to be the preferable to alternative forms the fiscal policy rules to stabilize the macroeconomic volatility and welfare of oil-exporting countries.

[23] Other economic literature in this context means the literature published by international financial institutions like the World Bank, IMF, etc.

These rules clearly outperform fiscal rules that only target the debt-gap and are slightly more advantageous to fiscal rules that only respond to the output gap" Snudden (2016).

These measures include the introduction of rules-based countercyclical policies, reduction of public expenditures, external and internal borrowing, introduction of new and increase or sometimes decrease and better administration of existing taxes, fighting illegal capital flight, depreciation of national currencies and so on.

Even though this is one of the first obvious responses to the decrease of budget revenues, such adjustments have to be thought-out thoroughly to avoid potential economic disadvantages. For example, over-taxation of businesses can easily lead to further decrease in tax collection as businesses can choose to close down, avoid taxation or migrate abroad. This measure requires a high quality and consistent government strategic planning and management and well-balanced approach to its implementation.

A good observation about financial and fiscal policy adjustments was made by Luk (2017) "Efforts towards policy or fiscal reforms are often undermined during periods of strong oil prices. Oftentimes, it may lead to overly optimistic views that prices will continue to remain high, prompting governments to overspend. Saudi Arabia's massive fluctuations in budget balances went from 13.6% of GDP in 2012 to a deficit of -15% in 2015."

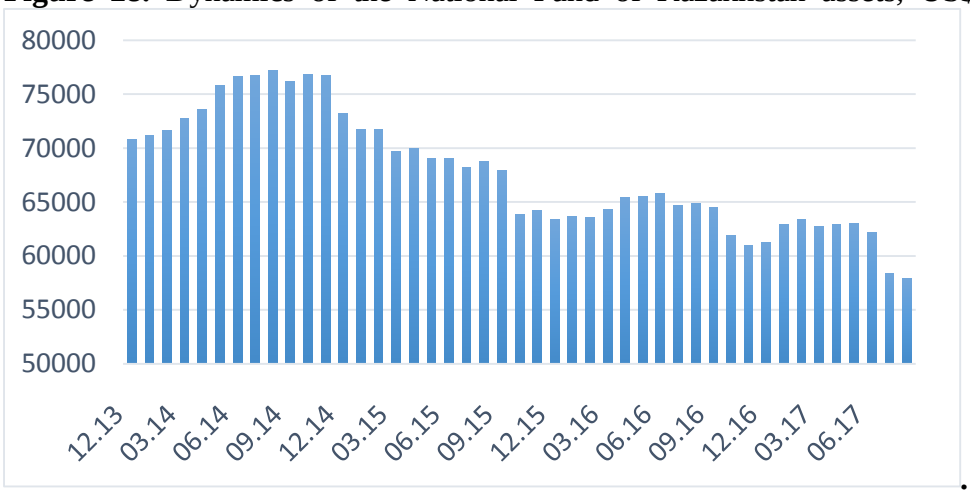
9.2.2. Withdrawals from reserve assets

OECs' governments use various budgetary and extra-budgetary funds (EBFs) to mitigate the impact of low oil price cycles. Budgetary funds are mostly used to mitigate first and immediate needs of the state budget and are not planned for long-term use. In cases of longer declines of budget revenues, there is a need to use so called sovereign wealth or stabilization funds, the aim of which is "to reduce the impact of volatile revenue on the government and the economy." Davis et al. (2001).

Sugawara (2014) noted that "The econometric analysis reveals that stabilization funds contribute to smoothing government expenditure. The main specification shows that the expenditure volatility in countries with stabilization funds is 13 percent lower than that in economies without them."

OECs' economies have become extremely dependent on stabilization funds and this can lead to the depletion of the country's reserves in a fairly short time because the periods of the biggest withdrawals from EBFs coincide with the periods of the smallest (if any) receipts. Another serious concern about stabilization funds is their ineffective management, which results in low profitability.

Figure 28. Dynamics of the National Fund of Kazakhstan assets, US$m



Source: Own construction based on the National (Central) Bank of Kazakhstan data

It is very interesting to have a look at successful examples. The best is certainly the Norwegian Government Pension Fund Global. In spite of its name, this is not a pension fund in the conventional sense, as it derives its financial backing from oil profits, not pension contributions, but a sovereign wealth fund. Mohn (2016) mentioned that "A defining ambition of the oil fund mechanism and the fiscal policy rule is to ensure a separation between the

accumulation of oil and gas revenues on the one hand, and the government expenditures of resource-related revenues on the other."

Figure 29. Selected sovereign-wealth funds

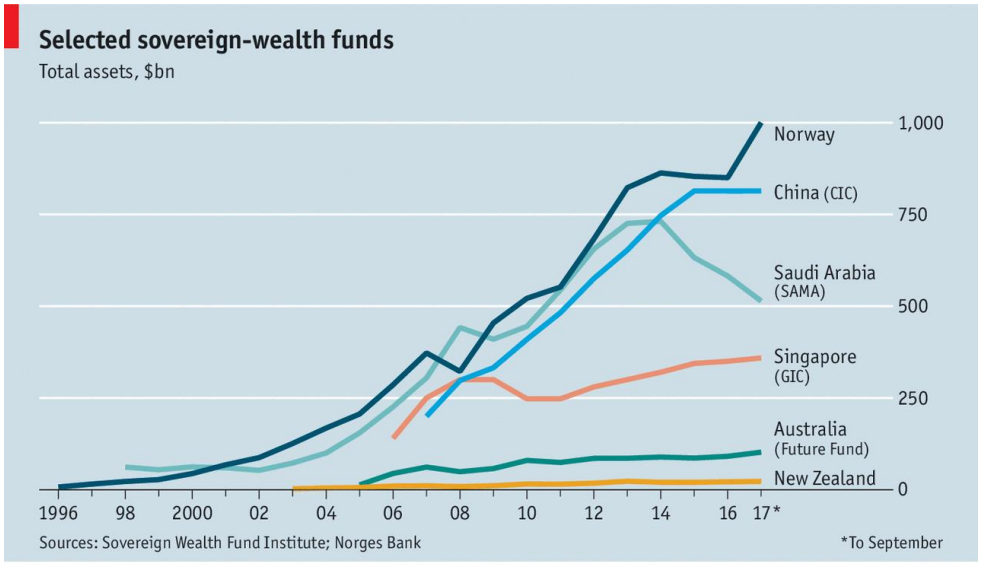


Figure 29 above also shows, that similarly to the National Fund of Kazakhstan, the Saudi fund SAMA has started to decrease since 2014.

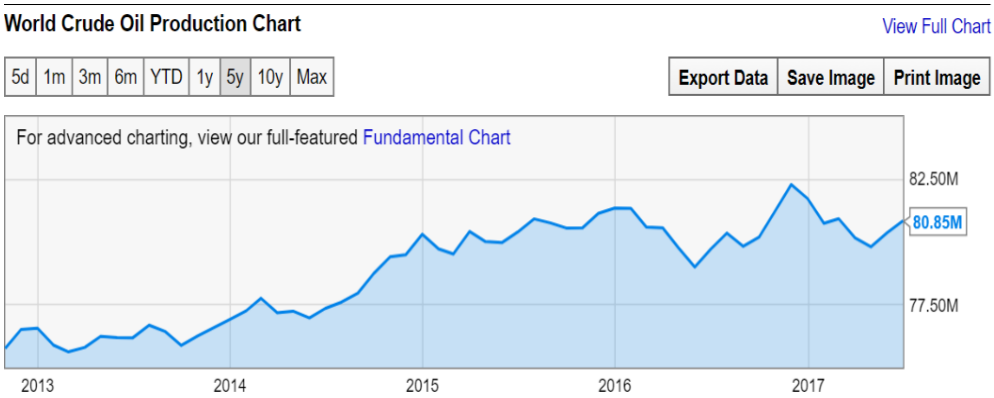
The main reasons behind the success of the Norwegian fund is the Norwegian government's adherence to strict economic, financial and fiscal policies. Other reasons include the Fund's sound management, absence of corruption and strict financial discipline.

This is not a mandatory measure and should be avoided if the situation permits.

9.2.3. Increase of oil production

The increase in physical volumes of production can partially or even completely compensate for the reduction in revenues from price reductions. It is the reason why OECs use this strategy widely and this can be seen well from Figure 30 below. The substantial increase in crude oil production coincided with the beginning of the oil price plunge (mid-2014).

Figure 30. World Crude Oil Production Chart



Source: US Energy Information Administration data. YCharts construction.

However, this is not always possible. Quick increase of oil production requires high quality management, advanced technologies and long-term strategic planning. To be able to achieve this goal, oil companies must invest in geological exploration and new technologies in advance. However, this often difficult as governments usually require oil companies (especially national ones) to finance different social programs diverting finances from their core activities. Interestingly, the main OECs' competitors, namely US shale oil producers, have access and continuously adopt best practices and improvements in oil production.

A crucial point related to the increase of oil production is that over-supply of crude oil to the world markets stimulates further decrease of oil prices. This fact is acknowledged by all the OECs, but attempts to increase oil prices through combined decrease of production have largely failed.

In general, this policy, which leads to selling the exhaustible resource at low prices, cannot be recommended, but often implemented because it provides immediate results.

9.2.4. Economic liberalization

"Economic liberalization encompasses the processes, including government policies, that promote free trade, deregulation, elimination of subsidies, price controls and rationing systems, and, often, the downsizing or privatization of public services" Woodward (1992). In most of OECs, economic liberalization is usually at the top of the agenda when there is no enough oil export revenues to support the national economy, because economic liberalization usually positively affects the economy. So one of possible ways is progressive elimination of government control over economic activities. Nevertheless, in addition to such possible advantages of economic liberalization as increase in foreign investment, increase in efficiency of domestic firms, rise in the rate of economic growth, control of prices and so on, there are several potential disadvantages. They include growth of unemployment, losses to domestic industries, which often cannot compete with foreign companies, increased dependence on foreign economy when economic recession in one trading partner's economy can spiral into another's economy and unbalanced development of sectors.

Taking into consideration potential disadvantages, OECs' governments are in some cases reluctant to engage in economic liberalization and become less committed to economic liberalization reforms in the periods of economic upturn, which coincide with high oil price cycles. This circumstance raised scepticism about governments' commitment and even implementability of OECs' economic liberalization programs.

Economic liberalization is a very important mechanism of counteracting negative consequences of oil price plunges. Main economic liberalization measures implemented in OECs considered below. It should be noted that these measures are often quite closely inter-related.

Privatization

At first glance, this is a very attractive measure allowing to receive necessary budget revenues relatively quickly. And it does not only provide direct budget revenues from selling. Privatization often grants a discharge from obligations to support loss-making government-owned assets. However, in the periods of low oil prices many assets in OECs tend to fall in price and very often an OEC government receive just a small share of what it spent for purchase or creation of this asset. Because of this obstacle OEC governments often reluctant to undertake this measure in the periods of low oil prices, but a need in budget revenues forces them.

In general, this measure as many other measures described below should not be commenced after oil prices start to decline. A much wiser approach is to implement them continuously and in case of privatization sell government-owned assets in the periods of high prices accumulating these proceeds in stabilizations funds.

Economic diversification

Usually more diversified countries such as Mexico, Canada and Norway demonstrate smaller elasticity of GDP per capita to oil price movements. Unfortunately, this measure does not usually receive due attention in the periods of high prices. It comes on the top of national agendas in the periods of low oil prices, but it is obvious that economic diversification cannot bring the desired results within a short time. It has to be a lasting exercise and OEC governments understand this well. This measure cannot be considered as a quick response and has to be thoroughly prepared and implemented.

Attracting foreign direct investments (FDIs)

In some OECs only limited amounts of local capital can be used to finance economy in general and the energy sector in particular. This makes the attraction of foreign capital for privatization of existing or creation of new businesses an important strategic task. It is important to point out that foreign

investors bring not only funding, but also technologies, expertise and management. Even though receiving economic benefits from attracting FDIs takes some time, this is an attractive measure usually very favourably perceived. It is worth pointing out that there is always a time span between the commencement of attracting FDIs and the achievement of results. The OECs would be in a much better position if they start this process in the periods of high oil prices.

Small and medium entrepreneurship (SME) development

This measure also look as an obvious response to the decrease of budget revenues. The usual logic is as follows: if governments cannot continue to exercise paternalistic economic policy further, they should then let the citizens to take care of themselves and where possible create incentives for SME development. In practice this is quite difficult as in the first place starting a business in the periods of economic decline is more difficult due to narrowed consumption and increased governments' attempts to increase taxes and customs duties. A good incentive could be partial government support of SME development through subsidized credits. However such plans confront with the need to cut public expenditures. Similarly to many measures mentioned above, this measure has much better chances for success if commenced in the periods of high oil prices.

9.2.5. Other measures

Certainly, the measures listed above are not the only ones used by OECs' governments. There are others like, for example, the abandonment of expensive image-building projects like UAE project to create human settlements on Mars by 2117 and expensive exhibitions, sporting events and international gatherings in Azerbaijan, Kazakhstan and other OECs, but the author tried to concentrate on the most obvious and widely used measures.

9.3. Summary

Having considered the information above, the author suggests to divide the mitigation measures into two main groups: (i) immediate measures, which include financial and fiscal policy adjustments; withdrawals from reserve assets; increase of oil production; privatization; and (ii) long-term measures: economic diversification; attracting FDIs; SME development. The difference between these groups is that immediate measures are implemented in the periods of oil price plunges and long-term measures should also be implemented in the periods of high oil prices. It has been repeatedly noted above that transferring the 1st group measures to the 2nd group will certainly increase their effectiveness and the implementation of the 2nd group measures should not be abandoned in the periods of high oil prices. Per the author's view, the main impediment, which prevents the implementation of all the measures mentioned above is the lack or absence of the government's commitment to continuous and difficult economic and policy reforms.

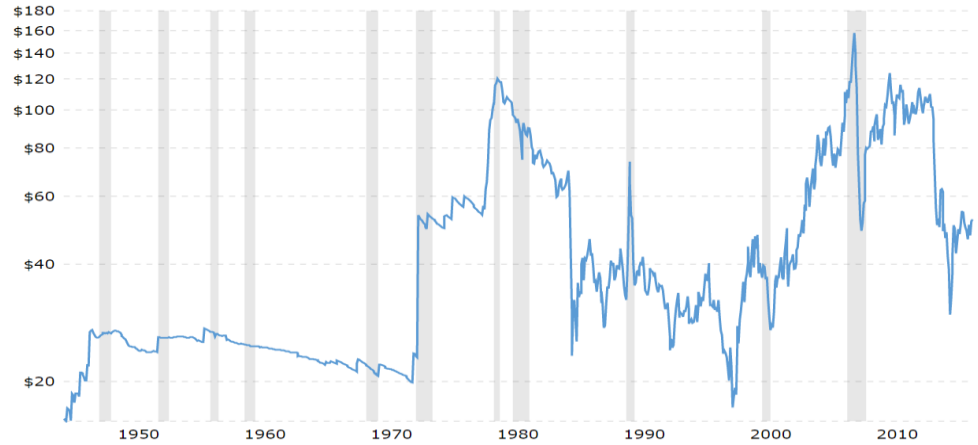
It is necessary to point out that there is always a combination of different measures used and this has become the usual practice of OECs governments. During oil price slumps, the situation is changing very quickly, but their consequences can last for a long period of time. This is why it is critical to use different measures, some of which will address short-term consequences and others long-term ones.

Based on the above-mentioned, the following three factors can be identified as playing the crucial roles in overcoming negative consequences of oil price plunges:

1. Establishment of longer-term planning horizon. Even though OECs made some important steps in this direction having recently prepared such development programs aimed at reducing dependence on oil as Saudi Vision 2030, Abu Dhabi Economic Vision 2030, Kuwait 2035

vision, etc. there is a clear need in longer-term planning because as seen in Figure 31 below the high and low cycles can last 15-20 years.

Figure 31. Crude oil prices - 70 year historical chart



Source: Macrotrends

2. Development of counter-cyclical policies. Practically no effective counter-cyclical policies have been so far developed in OECs. A good example could be the Chilean Structural Balance Policy, which has already proven its effectiveness.
3. Government's commitment to the strict implementation of continuous and often difficult economic and policy reforms. As described above, this is a key and decisive element in overcoming negative consequences of oil price plunges in oil-exporting countries.

The OECs' governments can optimistically believe that the period of low oil prices will not last for long and give way to another period of high prices. However, the effect of the negative processes caused by the oil price plunge can stretch for a longer period and affect the economic stability in these countries in a longer time, even if the world situation changes. A set of long-term, balanced, coordinated and well-thought-out measures combined with the

strong government's commitment to their implementation are essential for counteracting negative consequences of the current and future oil price plunges. It is important to underline that serious commitment of OECs' governments to implementing the mitigation measures mentioned above is the cornerstone for their success.

9.4. Measures implemented by the government of Kazakhstan

In Kazakhstan, the government has developed and is implementing the following:

1) The state infrastructure development program "Nurly Zhol" for 2015 – 2019. The goal of this program is the development of infrastructure to ensure long-term economic growth in Kazakhstan as well as the implementation of anti-crisis measures to support specific sectors of the economy in a situation of deterioration in the external markets;

The key objectives of the program are the development of transport and logistics, industrial, tourism, energy, housing and communal services and education infrastructure development, improving the competitiveness of SMEs and agribusiness entities, support to domestic mechanical engineering, export promotion, ensuring product quality through the development of laboratory bases, etc. In short, this program is aiming at comprehensive economic recovery of the country.

2) The Nationwide Anti-Crisis Plan of Measures and Anti-Crisis Action Plan of the Government and the National (Central) Bank to Ensure Economic and Social Stability in 2016-2018 (this is one document). It consists of two main parts: economic reforms to create a new structure of the Kazakh economy and prompt actions to stimulate growth and lending to the economy. This is the rolling plan, which will be adjusted in subsequent years.

3) The State Program of Industrial-Innovative Development of the Republic of Kazakhstan for 2015-2019. The State Program of Industrial-Innovative Development of Kazakhstan for 2015 - 2019 was developed in

accordance with the long-term priorities of the "Kazakhstan-2050" Strategy and in order to implement the key objectives of "Accelerating economic diversification" section of the Strategic Development Plan of the Republic of Kazakhstan till 2020.

The program is a logical continuation of the State program for Accelerated Industrial-Innovative Development of Kazakhstan for 2010 - 2014 and takes into account the experience of its implementation. The program is a part of the Industrial Policy of Kazakhstan and is focused on the development of the manufacturing industry with a concentration of efforts and resources on a limited number of sectors, regional specialization using the cluster approach, and effective sector regulation.

The Kazakh government continues declaring its commitment to minimizing consequences of the last oil price plunge. For example on 9 September 2016, the president of Kazakhstan at the enlarged session of the Government pointed out that the government's priorities have to include wide-scale entrepreneurship development especially in the agricultural sector, further expansion of micro-crediting, implementation of the US$332 million State Program of Industrial-Innovative Development (this program is aimed at the promotion of non-resource export-oriented industries), development of transportation infrastructure with allocation of US$219 million, development of agriculture with allocation of US$288 million, development of public-private partnership, new housing construction program. Then on 1 September 2016 the Kazakh president stated: "It is important to continue the work on reducing the dependence of Kazakhstan on fluctuations of world prices on raw materials… This is what I've been always talking about. After falling oil, gas and metals prices our revenues decreased by 40% Therefore, our priority is the government support for … companies producing non-resource products and working for export".

The number of anti-crisis documents adopted by the Government is not limited to the ones mentioned above. Understanding well that decreasing the dependence of Kazakh economy to oil and gas revenues is essential for ensuring country's stable economic development, the Government has been declaring the diversification of national economy as its first priority for many years. It has been adopting and is implementing numerous programs and plans. For instance, the national Strategy of Industrial-Innovative Development of Kazakhstan for 2003-2015 (not to mention other documents) was adopted back in 2003. It was said that this Strategy will pave a way for economic diversification. However, the result from implementation of all these documents is far from desired. Moreover, as it was mentioned earlier, the share of oil and gas industry in total Kazakh GDP increased from 10.9% in 2001 to 25.2% in 2012. This share again decreased to about 20% of GDP by the beginning of 2016, but this happened because of the decrease of world prices on these commodities only. Diversification efforts are undermined by symptoms of Dutch disease, which made the non-oil and gas sectors uncompetitive internationally.

Thus, during the period of high oil prices, the Kazakhstan's raw material orientation of the economy did not decrease. *A contrario*, its dependence on extractive industries in general and oil and gas industry in particular has intensified.

Interestingly, economic diversification efforts of the Kazakh Government along with international oil price fluctuations are considered among the most important things to watch by international financial organizations working in or planning to work in Kazakhstan.

Esanov (2012) suggested that the Kazakh "government diversification policies failed to produce the desirable outcomes due to some misaligned economic policies, weak regulation of the financial sector, shortcomings in the diversification strategy, weaknesses of political and economic institutions, and

the country's geographic location. Given lax regulations, the banking sector excessively borrowed from the international capital markets and provided loans to the construction sector and for the consumption of durable goods instead of lending to the manufacturing sector. Another reason for ineffective diversification policies lies in the design of a faulty diversification strategy. The government drew heavily upon the East Asian experience and overlooked local peculiarities. Absence of viable democratic and economic institutions hampered government accountability and responsiveness. Finally, the country's landlocked position hindered the execution of an effective diversification policy."

- The number of people employed by extractive industries is sufficiently smaller in comparison with such sectors as agriculture, SMEs, transportation;
- Public sector should not be considered as an alternative to extractive industries as it largely relies revenues from extractive industries;
- National security is a pre-requisite. This is absolutely obvious.
- Political will to implement diversification including fighting corruption, creating necessary policy documents, regulatory and legal framework and determination in achieving set goals.

The current oil crisis has once again raised questions on how to decrease the dependence of the Kazakh economy on oil price fluctuations. The need to ensure that next oil price plunges will not cause economic crises in the country is obvious. It is a time to look at the situation from another angle and understand why all previous efforts to diversify the Kazakh economy failed. This matter is addressed separately further below.

9.5. Main problems, which prevent economic recovery

Obviously, the oil price plunge is not the only problem of the Kazakh economy. It is suggested that the main reasons, which led to the current situation and prevent economic recovery are different and include:

- Already mentioned lower profitability of non-oil industries. This circumstance prevented sufficient investments to these industries and practically undermined diversification efforts;
- Spillover effects of Russia's economic crisis, including indirect effect of anti-Russian sanctions;
- Spillover effects of China's economic slowdown;
- Curtailing economic reforms in the period of high oil prices;
- Exceptionally high share of the state in the economy;
- Corruption[24];
- Poor management and lack of personal responsibility of responsible officials;
- Increased social spendings.

9.6. Problems in the oil and gas industry

It is worth emphasizing that the oil and gas industry also experiences a difficult period. Buldybayeva (2013) carried out a series of interviews with industry experts who pointed at the following problems:

Table 16. Main problems in the development of oil and gas industry

No	Problem	Comments
1.	Oil price declines	- This is the main problem, which the industry faces. - Oil price fluctuations are the main challenge of the industry and the country.
2.	Corruption	- Corruption in allocation of oil blocks, transportation routes, hiring personnel, etc.; - Widespread corruption prevents proper development of the industry and territories.
3.	Low level of management in the industry	- Misappropriation of funds; - Non-professional managers with no experience in the industry; - Low professional level and poor organization of work in Kazakhstan companies. Unfortunately, the situation does not improve over time. It is better in companies with foreign participation.

[24] Kazakhstan ranked 123/168 by Transparency International http://www.transparency.org/country/#KAZ

4.	Depletion of hydrocarbon reserves	- Depletion and incomplete replacement of hydrocarbon reserves are real threats for further development of the industry; - Deterioration of the resource base is increasing; - Underfunding of prospecting works on hydrocarbons is the root of the problem.
5.	HSE (health, safety and environment) negligence	- Underfunding of HSE activities is widespread; - Growing threat of technogenic catastrophes; - Oil spills on the shelf threaten the ecological situation in the Caspian Sea.
6.	Inadequate legal framework and taxation system	- Intentional lack of legal clarity create a lot of problems; - Inadequate structure supervisory and regulatory agencies; - Rigid taxation hinders the development of the industry.
7.	Reduction of investments in the industry	- Reduction of investments to the industry occurs at the most difficult moments when oil prices fall. This creates a double blow; - Gradual depletion of deposits requires a large investment in exploration, production and technologies.
8.	Insufficient professional level of employees	- Substantial investments to professional training of employees are required.
9.	Insufficient social protection of employees	- Cases of negligence of social protection of employees still take places; - Negligence of social protection can lead to social upheavals.

9.7. Economic diversification

This topic should be considered separately as it is usually perceived and recommended as the main solution against cyclical economic downturns caused by oil price declines. However, practical implementation of such measures in different OECs brought to light a lot of problems, which need to be addressed and tackled properly. In fact most of government economic diversification programs in most of oil-exporting counties failed. The author of this document does not share wide-spread optimism about such measures in the existing economic model of Kazakhstan. He is of the view that before undertaking any further step in this direction, it is necessary to understand the reasons, which resulted in failures of all previous efforts. Otherwise, new measures can become just another dissipation of limited financial resources.

The review of the current situation with diversification efforts in different resource-dependent countries shows their little success. In the periods of high oil prices, diversification does not seem urgent and important, so

difficult structural reforms are often postponed. When oil prices go down it usually appears that time and financial resources required have been wasted. Interestingly that though the need to diversify economies away from dependence on natural resources is widely acknowledged, these countries keep making the same mistake for tens of years. This is especially true when their oil production horizon is still long.

As a result, this measure usually follows a difficult path. Examples given below serve good illustrations to this statement. The reasons for failures of these policies are deep-rooted and should be properly studied. To achieve this goal, this document attempts to look at economic diversification efforts in oil-exporting countries in general and in Kazakhstan in particular and suggests that it should not considered as the main solution.

Experience of economic diversification efforts in selected OECs

The OECs have been selected depending on the size of their crude oil exports.

Table 17. 15 countries that exported the highest dollar value worth of crude oil in 2016

No	Country	Oil Export, US$ bn	% of total crude oil exports	Fuel exports (% of merchandise exports), 2015	Concentration Index[25]	Diversification Index[26]
1	2	3	4	5	6	7
1.	Saudi Arabia	133.3	17	78.4	0.529	0.757
2.	Russia	86.2	11	63	0.316	0.644
3.	Iraq	52.2	6.6	99.97	0.972	0.914

[25] Concentration index, also named Herfindahl-Hirschmann Index (Product HHI), is a measure of the degree of product concentration. An index value closer to 1 indicates a country's exports or imports are highly concentrated on a few products. On the contrary, values closer to 0 reflect exports or imports are more homogeneously distributed among a series of products.

[26] Diversification index is computed by measuring the absolute deviation of the trade structure of a country from world structure. This index takes values between 0 and 1. A value closer to 1 indicates greater divergence from the world pattern. This index is a modified Finger-Kreinin measure of similarity in trade.

4.	United Arab Emirates	51.2	6.5	42.5 (2014)	0.243	0.485
5.	Canada	50.2	6.4	21.32	0.140	0.377
6.	Nigeria	38	4.8	91 (2014)	0.717	0.830
7.	Kuwait	34.1	4.3	89	0.598	0.787
8.	Angola	32.6	4.1	95	0.934	0.895
9.	Venezuela	27.8	3.5	97.69 (2013)	0.748	0.847
10.	Kazakhstan	26.2	3.3	68	0.658	0.793
11.	Norway	25.7	3.3	57.7	0.334	0.637
12.	Iran	20.5	2.6	70.48 (2011)	0.455	0.735
13.	Mexico	18.8	2.4	6.08	0.122	0.414
14.	Oman	17.4	2.2	62	0.447	0.716
15.	United Kingdom	16	2	7.66	0.112	0.342

Sources: OPEC, World Bank, BP Statistical Review of World Energy, UNCTAD[27]

The countries listed above can be divided into the following main groups. Kazakhstan is considered separately further below. Examples provided to illustrate each groups performance.

Group 1: Countries heavily dependent on oil production with weakly diversified economies

This group includes such countries as Saudi Arabia, Kuwait, Oman and Abu-Dhabi emirate of the United Arab Emirates.

At first glance it looks obvious not to consider Abu-Dhabi and Dubai separately as they are parts of the same country – the United Arab Emirates. However, the two emirates have very contrasting roles in the international system. Per the information of the UAE Trade and Commercial Office “Abu

[27] http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=120

Dhabi holds 94% of the UAE's oil reserves, or about 92.2 billion barrels."[28] So, as advised Davidson (2007) "the emirate (Abu-Dhabi) attempts to channel a large proportion of its surplus oil wealth into building a substantial buffer of overseas interest payments that can be called upon to stabilize the domestic economy should there be future oil price slumps or other such periods of austerity." In contrast, as pointed out by the same author "By the mid-1990s Dubai's non-oil sectors were already contributing 82 percent of the emirate's GDP, but most remarkably (as the real estate and tourism strategies began to kick in) since then the non-oil share of GDP has increased to over 94 percent."

Oil remains and in the foreseeable future will remain the basis of their economies, but these countries put some of efforts into diversification. The results, however, are still very far from desired. Hvidt (2013) wrote that "Data shows, however, that the countries remain in a position where the oil sector continues to dominate the economy, and that few of the industries and services established would survive in a post-oil era. So the GCC states continue to be in the situation where they sell their hydrocarbons on the world market and use the proceeds to import almost all of their living requirements and large parts of their labour force. Viewed in this manner, the diversification strategy has largely failed." The same author also advised that "Kuwait has done little to diversify its economy over the years." Albassam (2015) informed that "The Saudi government has issued 10 development plans since 1970, each covering five years, and economic diversification is a main objective of all these plans." He then noticed "that, after more than 40 years of development plans aiming to diversify the Saudi economy, oil is still the main engine driving the economy". Describing similar efforts in Oman, Asra Mubeen et al (2017) also concluded that "In spite of all these efforts, diversification of the economy

[28] Per the information of the UAE Embassy to the USA "Abu Dhabi holds 94% of the UAE's oil reserves, or about 92.2 billion barrels." http://www.uaetrade-usa.org/index.php?page=economic-sectors-in-uaeandcmsid=48

remains in its nascent stage and the economic dependence on oil has not come down amidst low oil prices. Diversification in Oman has not achieved its expected results".

It is worth pointing out that "…Abu Dhabi alone commands nearly 7 per cent of the world's proven oil resources. As such Abu Dhabi is by far the wealthiest emirate, and sponsors development in the other emirates through its contributions to the budget of the Federation and through large off-budget payments to the other rulers..." (Hvidt, 2013).

Group 2: Countries excluded from consideration

This group includes two different sub-groups:

Subgroup 2 A: Countries with developed already diversified economies

This group includes Canada, Norway, the United Kingdom and with certain reservations Mexico. Due to the obvious reason, the author excluded these countries from consideration.

Subgroup 2 B: Countries excluded because of extremely difficult economic and political situation

The author intentionally omitted Iraq as its economy was severely affected by recent wars and internal clashes and riots. Venezuela was also excluded as the country " where oil still remains the country's main and almost only export product – is going through likely the worst economic crisis in its modern history, partly triggered by a sharp drop in world oil prices preceded by over a decade of market-unfriendly policies" (Bahar, 2016). Smaller oil-exporting countries have been omitted for the sake of brevity.

Group 3: Countries with very limited progress in economic diversification

This group includes Nigeria and Angola, which show quite similar performance.

Countries of this group perform poorly in terms of diversification. In spite of widely declared need to diversify the economy, the countries continue to depend heavily on petroleum revenues. Onodugo et al (2015) noticed that

in 2015 petroleum export was more than 92% of Nigeria's export revenue and created more than 80% of the government's budget. Angola performs similarly. Golub and Prasad (2016) noted that "Angola's economy revolves around oil and to a lesser extent diamonds, making it the second most concentrated in the world. Until the recent decline, oil and gas accounted for about 45% of GDP, 96-98 % of exports and 75% of government revenue... Diamonds provide another 5% of GDP and 1-2% of exports. Manufacturing and agriculture account for only about 5%-7% of GDP each, despite the fact that some 70% of the population is employed in agriculture."

The need to diversify national economies of this Group with a view to widening the sources of revenue and decreasing dependency on the crude-oil sector has been many times reiterated by international financial organizations. Urgent and well-designed measures are required to improve the situation.

Group 4: Countries with relatively diversified economies implementing major diversification programs.

This group combines very different countries (Russia, Dubai emirate of the UAE and Iran), which put a lot of efforts in diversifying their economies. In spite of numerous failures, this group is of the most interest for the purpose of this article as these countries manage to achieve at least partial progress. Because of this reason, the group is considered in more detail.

Worth pointing out that two countries of this group namely Russia and Iran have relatively diversified economies and are for big extent independent of imports. However, their exports are not very diversified and this shows the missing competitive power of their economies. Besides, these two countries possess quite sizeable populations with Russia having more than 144 million citizens and Iran more than 80 million forming sizeable internal markets.

Appeals to diversify the Russian economy have been heard since the 90s, but the country continues to rely largely on a commodity-based growth model. Numerous efforts to diversify the Russian economy and government's

heavy investments in the promotion of high-tech industries produced very limited results. As stated by EBRD (2012) "despite significant state-led efforts since the mid-2000s, the Russian economy has not diversified". Moreover, the share of fuel exports in merchandise exports was constantly growing from 1998 to 2013. The decline of this share after 2013 can be attributed to the sharp decline in oil prices as physical volumes of fuel exports have been growing.

In 2014, the Russian government introduced import-substitution schemes to counteract the effects of Western sanctions. It is not clear yet whether these measures will yield substantial results. Nevertheless, one example is already visible - weaker ruble and low energy prices assisted in the country's move towards retaking leadership in the world wheat trade. The U.S. Department of Agriculture forecasts Russia to become the biggest wheat exporter in 2016-17. Though sounding impressively, this has not helped much in reducing the share of fuel exports because of the initial large difference in export revenues.

Since the UAE was formed in 1971, the diversification of the economy away from petroleum has been a clearly stated government policy. Per the World Bank data (column 5), in 2014 the share of fuel exports in merchandise exports was equal to 42.5%. This figure is more typical for countries with diversified economies and the UAE is praised as having the most diversified economy in the GCC. However, this is mostly true for Dubai. Other emirates continue depending on oil revenues. In this regard, worth pointing out that the Dubai's economy was severely affected by the world economic crisis, which began in 2008. In 2009 Dubai, which is often considered as a model of successful diversification, was on the brink of default and was saved by Abu Dhabi, which provided a generous financial support. Davidson (2007: 43.p.) also informed that "Abu Dhabi seeks to bolster its very different neighbour. One such link is Abu Dhabi's daily donation of 100,000 barrels of oil to Dubai. At current prices, this 'gift' represents more than $650 million a year. Similar

generosity was shown in the winter of 2001 and through much of 2002 when Abu Dhabi purportedly baled out the Jumeirah International Hotel chain when its Dubai-based hotels (including the landmark seven star Burj al-Arab) were suffering close to zero occupancy rates following the September 2001 attacks." This means that the Dubai's economic model is less sustainable even in comparison with most of the other less diversified countries.

World Bank's data on the share of fuel exports for the UAE (column 5) are fragmentary. However, even though one can see that this share decreased from 65.345% in 2007 to 42.496% in 2014, WTO (2016: 67.p.) is of the view that "the UAE remains highly dependent on oil, which represents approximately 75% of total government revenues".

The performance of Dubai's economy in 2008-2009 gave a warning alert that economic diversification, which ultimate goal is to make economies sustainable to oil price fluctuations does not necessarily provide the desired results. Because of unsustainability of the Dubai model and the high dependence of other emirates on oil revenues, the author abstains from including the UAE to the group of well-developed diversified economies.

Sanctions imposed on Iran for its nuclear enrichment program decreased its oil exports substantially, but may have helped the country to cope with the commodities slump by forcing it to diversify its economy. Clawson (2013) noted that "For years, Iran's leaders called for reduced reliance on oil but did little to meet that goal. Western sanctions have seemingly spurred them to action…"

The World Bank stated that "The slump in oil prices has hurt the Iranian economy but by less than other oil producers in the region. The reason is that compared to other oil producers, the Iranian economy is more diversified and therefore less dependent on oil revenues. Oil accounts for about 30 % of

government revenues."[29] This opinion is shared by Aasim Husain, Deputy Director of Middle East and Central Asia at the International Monetary Fund "Many of Iran's neighbors are even more dependent on oil … It is much more diversified than others in the region" (Barnato, 2016).

Recent political developments as another imposition of sanctions on Iran by the Trump administration in February 2017 and President Trump's announcement that the USA is quitting the Iran nuclear deal of May 2018 play a decisive role when considering the situation in Iran. These factors have negatively affected the country's economic performance and complicated the assessment of Iran's economic diversification measures.

Thus, keeping the political environment aside, Iran can be considered as a successful example.

Summarizing the above, it is possible to conclude that such efforts in most of oil exporting countries produced very limited (if any) results. Existing examples of are either not sustainable like Dubai or fueled by mainly political reasons.

Economic diversification efforts in the Republic of Kazakhstan

Non-extractive industries in Kazakhstan[30] are not only small, but have been shrinking over the last years. For instance, per the information of the National Bank of Kazakhstan (2016: 24.p.) "the share of oil and gas industry in total GDP increased from 10.9% in 2001 to 25.2% in 2012, making the oil and gas industry one of the main drivers of GDP growth, and one that plays a vital role in Kazakhstan's GDP structure." The same source mentions that "soaring prices of oil, minerals, and other commodities have helped lifted GDP of Kazakhstan since 2000." By the beginning of 2016 this share decreased

[29] World Bank's publication Iran's Economic Outlook - July 2016 "How is Iran Reacting to Low Oil Prices?" http://www.worldbank.org/en/country/iran/publication/economic-brief-july-2016

[30] In addition to the oil and gas production, there is a well-developed mining industry in Kazakhstan.

again to about 20% of GDP, but this happened because of the decrease of world prices on these commodities.

Similarly, according to the World Bank's data, the share of fuel exports in merchandise exports grew from 66.552% in 2007 to 76.627 in 2014 (except a small decline in 2012). In 2015, this share went down to 68.018%, but this again happened because of the decrease of world prices on these commodities.

Concentration and diversification indexes of Kazakhstan are given in Table 13 above. These indexes (0.658 and 0.793 respectively) are typical for a non-diversified economy.

The situation is further complicated by the fact that price cycles of main Kazakhstan's export commodities are very similar. This was well demonstrated in Figure 6 above.

This means basically the following:

- Attempts to diversify away from oil into other major Kazakhstan's export commodities like metals and grain cannot yield desired results;
- Kazakhstan should look for other areas for its diversification efforts. This is developed further below;
- In any case, over-reliance on extractive industries provokes macroeconomic cyclical economic instability.

Practically all the previous efforts of the Kazakh government to diversify the economy failed. A summary of Kazakh government diversification efforts was given above.

Another big problem is the efficiency of investments in economic diversification. No official data on return of such investments in Kazakhstan could be found.

The current oil crisis calls for a need to understand why all previous efforts to diversify the economy failed.

Having looked at what is happening with similar efforts in different countries, we can now try to understand what reasons are behind these failures.

The main, but not the only reason for shrinking non-extractive industries is that they are usually less profitable. We should acknowledge that extractive and especially the oil industry will remain more profitable in the foreseeable future.

Economic diversification on the surface appears to be an appealing business strategy. Economic literature is full of explanations why it is so important. It is usually stated that this measure is required to mitigate the effects of resource price fluctuations and symptoms of Dutch disease. Numerous efforts have been made to communicate to the governments of resource-dependent countries the need to diversify their economies. However, the results of such efforts in most of these countries remain to be very limited and are often dictated by non-economic reasons.

Based on the literature review and meetings with Kazakh government employees and businessmen, the following main reasons of economic diversification failures have been identified:

- Lower profitability of non-extractive industries in Kazakhstan. The reasons of lower profitability include strong competition from Chinese and Russian producers, insufficient size of the local market, insufficient number of qualified technical personnel and able professional managers, etc.

  They are even more profitable in Kazakhstan where geological investigations, which usually constitute a lion's share of these companies' expenses, were mostly done during the Soviet period.
- Insufficient readiness for change among government employees of different level. This is caused by the fact that diversification is a very long term issue, which limits the readiness for change and for having economic and social disadvantages in the short time.
- Lack of enabling environment. There is no determination on the government's side to implement structural reforms, without which

diversification is not possible. The country needs to go away from the current model of state capitalism. However, this move is intentionally restrained. The government is trying to substitute reforms by financial injections.

- External economic shocks, namely the economic crisis in Russia (the economic crisis in Russia depreciated the Russian rouble over international currencies and made Russian goods much more competitive)**.**
- Inappropriate government interventions into the banking sector, which resulted in the serious banking crisis.
- Economic diversification is impossible without political reforms and decentralization of power.
- Being a small country in terms of its population – just 18 million, Kazakhstan has a very small internal market. The market size is a serious obstacle for the development of non-extractive industries.
- Insufficient attractiveness of non-extractive industries for foreign investments, which have been so far mostly limited to communication, pharmaceutical and food sectors.
- Insufficient number of qualified technical personnel and able professional managers.
- Local producers face harsh competition from Chinese ones. It is obvious that in most cases Kazakh producers cannot compete.
- Political uncertainty both internal and external is another serious concern for local and foreign businessmen and banks forcing them to abstain from long-term investments and often to withdraw funds abroad.
- Government investment programs are largely poorly prepared and unsuccessful.

As mentioned by Adillov (2016) "The ultimate goal of the first phase of the program (State Program for Accelerated Industrial-Innovative Development of Kazakhstan for 2010 – 2014) is to ensure diversification of the economy, the reduction of volumes, the increase in budget revenues, supplying the domestic market with quality domestic products," – pointed out Kazakh parliament member Gulzhana Karagusova and stated: "Unfortunately, we must admit that for five years, none of these problems have been not solved." The amount spent on the program exceeded US$28.5 billion.

Pavlova (2014) mentions that “in Norway every US$10 spent on diversification provides just US$5 of return”. Obviously in less developed countries the return would be even smaller. Employee of the Kazakh Ministry for Investments and Development informed that the Ministry has undertaken an internal assessment of diversification programs profitability. Its results are confidential, but the employee advised that the results of Norway’s efforts are certainly much better.

10. Conclusions and recommendations

Having considered the international experience and previous efforts of the Kazakh government to decrease the dependence on oil price fluctuations in general and overcome the consequences of the last oil price plunge and after consultations with the Kazakh government employees, the following measures can be recommended for the government of Kazakhstan and other oil-exporting countries:

- Sustainable development has to be not only declared, but to really become the main development priority of the country;
- As pointed out in the previous Chapter 9, if the government cannot continue to exercise paternalistic economic policy further, it should then let the citizens to take care of themselves and where possible create incentives for SME development. This is why a thorough audit of existing legislation, regulations, practices of government agencies and law enforcement that affect business activities should be undertaken with the aim to reduce legal and regulatory barriers for businesses;
- Based on this audit, structural reforms similar aimed at providing more economic freedom to be implemented. The ultimate goal of these reforms must become the creation of business enabling environment in the country. Reforms should include decreasing tax burden on small and medium businesses, eliminating most of licensing requirements, substantial decrease of different government inspections, obligatory reporting and personal responsibility of government officials concerned;
- Keeping in mind that since 2008 financial crisis public finances deteriorated seriously, private businesses have to become a major driver of economic diversification. This is to be acknowledged and declared a national priority;

- Promotion of greater regional and international economic and trade integration. Further promotion of export of Kazakh goods through government-supported export credit guarantee schemes;
- Another measure, which could help the SME development in the country is liberalization of the Kazakh financial sector through lifting legal and regulatory barriers for foreign financial institutions with the aim to enhance access to credit, especially for SMEs;
- Serious efforts to attract foreign investors to be undertaken. However, it should be acknowledged and the reason is explained in the previous Chapter 9 that most likely these efforts will yield results in medium and long term;
- As mentioned in the paragraph 9.7 above "Practically all the previous efforts of the Kazakh government to diversify the economy failed." This is why a thorough audit of projects implemented under different government economic diversification programs is required. Preparation of further programs to be strictly based on the lessons learned from this audit;
- The government needs to be more careful in its spending, limiting the number of possible areas for investments. Currently, the government is implementing several investment programs to support private sector projects in different sectors. Instead of dissipation of limited financial resources, it is suggested to select areas where Kazakh products and/or services can be competitive. At the moment, transportation services, agriculture, food and pharmaceutical industries look more attractive;
- Enhancing vertical diversification in existing sectors by focusing on moving into higher value-added products in extractive industries;
- If a number of attractive domestic projects will be limited, the country can diversify into attractive foreign projects;

- To ensure improvement of environmental and social situation in the country through stricter legal enforcement of relevant legislation and increased personal responsibility of governmental officials concerned;
- Implementation of different workforce education and vocational training programs, orienting education and vocational training towards skills needed by the private sector;
- To consider a possibility of transferring the National Fund of Kazakhstan under the management of Norwegian Government Pension Fund Global.

The effect of the negative processes caused by the last oil price plunge can stretch for a longer period and affect the economic stability in Kazakhstan for a longer time, even if the world situation changes. A set of long-term, balanced, coordinated and well-thought-out measures is essential for counteracting negative consequences of the current and future oil price plunges. This document is an attempt to address this very important topic.

11. New scientific results

1. This dissertation considers the period since June 2014 when the last oil price plunge started. None of previous researches was fully dedicated to the consequences of the last oil price plunge for the Kazakh economy during this period.
2. The scenario analysis exercise undertaken in this dissertation clearly shows that the Kazakh government should adopt the low oil price scenario as the main one to make the country better adapted for future changes in the long run minimizing potential negative consequences.
3. None of previous researches studied the influence of oil price plunges on the migration situation in the western oil-producing regions of Kazakhstan. The dissertation analyzes the migration situation and proposes potential mitigation measures, which can improve the migration situation and more generally the situation in social sphere in the western oil-producing regions of Kazakhstan.
4. The dissertation does not share wide-spread optimism about the economic diversification, which is usually perceived and recommended as the main solution against cyclical economic downturns. The document considers the international experience and previous efforts of the Kazakh government and identifies the main reasons of economic diversification failures.
5. Having considered the international experience and previous efforts of the Kazakh government to decrease the dependence on oil price fluctuations in general and overcome the consequences of the last oil price plunge, the dissertation recommends for the government of Kazakhstan and other oil-exporting countries a set of possible mitigation measures.

12. Summary

The last oil prices plunge, which started in June 2014, affected the world economies seriously. This dissertation addresses the reasons, which resulted in this situation on the world oil market. It then analyzes consequences for oil exporting and importing countries, opportunities and challenges and suggests proactive strategies that will help them to tackle the situation prevalent after the sharp fall of crude oil prices of 2014. The world oil prices increased substantially in 2018, however, this increase (as all previous increases and decreases) is temporary as oil prices continue to be volatile. Therefore, this topic and the recommended measures remain important. This work is focusing on Kazakhstan as a typical oil-exporting country, analyses its economy and oil and gas sector as well as external environment. As additional examples, it is dealing with Azerbaijan as oil-exporting country and Turkey and China as oil-importing countries. Other countries are also considered, but to a lesser extent.

As many other similar scientific works, this dissertation uses the econometric VAR model to estimate the influence of oil price fluctuation on selected Kazakh macroeconomic variables. The research results generally reconfirm previous studies with some degree of discrepancy caused by the different timeframes. These results provide important information for the Kazakh government planning process.

Having considered the influence of oil price plunges on the selected Kazakh macroeconomic indicators, there is a need to look at potential situation developments and factors, which will affect them. For this reason, the scenario analysis approach is employed. The results received clearly show that the Kazakh government should adopt the low oil price scenario as the main one to make the country better adapted for future changes in the long run and make its development sustainable.

Special attention is given to the analysis of potential mitigation measures for overcoming negative consequences of oil price plunges. For this reason, the dissertation considers the experience of different oil-exporting countries and measures implemented by the government of Kazakhstan addressing the problems, which prevent the economic recovery.

Having considered the international experience and previous efforts of the government of Kazakhstan, this dissertation recommends a set of measures aimed at decreasing dependence on oil price fluctuations in general and overcoming negative consequences of the last oil price plunge to the government of Kazakhstan and leadership of other oil-exporting countries.

Certain subjects such as migration and economic diversification are considered separately because of their importance.

13. Summary in Hungarian

Az utolsó, 2014-ben kezdődött, olajár csökkenés komolyan érintette a világgazdaságot. Ezen disszertáció azokkal az okokkal foglalkozik, amelyek ehhez a szituációhoz vezettek az olaj világpiacon. Majd az olajexportáló és importáló országokra gyakorolt hatását vizsgálja, illetve a lehetőségeket és a kihívásokat, és a nyersolaj árak 2014-es éles zuhanásából fakadó problémákra javasol proaktív stratégiákat. 2018-ban a világ olajárak jelentősen megnövekedtek, azonban ez a növekedés (mint minden előző növekedés és csökkenés) időleges, minekután az olajárak továbbra is illékonyak. Tehát, ez a téma és a javasolt intézkedések továbbra is fontosak. Ez a munka Kazahsztánra fókuszál, mivel egy tipikus olajexportáló ország, analízálja a gazdaságát, a gáz és olaj szektorát, valamint a külső környezetét. Kiegészítő példaként a disszertáció foglalkozik Azerbajdzsánnal, mint olajexportáló meg Törökországgal és Kínával, mint olajimportáló országokkal. További országok szintén figyelembe vannak véve, azonban kisebb mértékben. Más tudományos tanulmányokhoz hasonlóan, ez a disszertáció is az econometric vector auto-regressive model-t alkalmazza, hogy megjósolja az olajár változások kiválasztott makroökonómiai változókra gyakorolt hatását. Az eredmények jellemzően megerősítik a korábbi kutatások következtetéseit, az eltérések a különböző időkeretnek tudható be. Ezen eredmények fontosak a Kazah kormányzati tervezés folyamatának tekintetében. Szem előtt tartva az olajár csökkenés hatását a kiválasztott makroökonómiai indikátorokra, szükségszerű, hogy figyelembe vegyük azokat a potenciális szituációs fejlődéseket és faktorokat, amelyek hatással vannak rájuk. Ebből kifolyólag a scenario analyses approach volt alkalmazva. Az eredmények egyértelműen azt mutatják, hogy a Kazah kormány számára elsősorban az alacsony olajár szenárió alkalmazása a javasolt, hogy az országot hosszútávon is felkészítsék a jövőbeni változásokra. Kiemelt figyelmet kapott a potenciális enyhítő intézkedések analízise, amelyek az olajár csökkenés negatív következményeit hívatottak orvosolni. Ebből adódóan, ez a disszertáció figyelembe veszi más olajexportáló országok tapasztalatait és a Kazah kormány által végrehajtott intézkedéseket, amelyek megakadályozták a gazdasági felépülést. Tekintetbe véve a nemzetközi tapasztalatokat és a Kazah kormány megelőző erőfeszítéseit a probléma megoldására, a disszertáció Kazahsztán kormányának és más olaj exportáló országoknak azon intézkedések alkalmazását javasolja, amelyek csökkentik az olajár fluktuációjából fakadó függőséget, és segítenek felülkerekedni a legutóbbi olajár csökkenés negatív következményein. Bizonyos témák, mint a migráció és a gazdasági változatosság, a súlyuknak megfelelően, külön vannak kezelve.

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15. Scientific papers and abstracts on the subject of the dissertation

15.1. Peer-reviewed papers published in scientific journals in English

Akhmedov E. (2018). Migration Processes in the Western Regions of Kazakhstan: Potential government measures to mitigate negative consequences of the current economic crisis. *Regional and Business Studies*. Kaposvar University, Hungary (in press).

Akhmedov E. (2018). Economic Diversification Issues in Oil-Exporting Countries. Case of the Republic of Kazakhstan. *Köztes-Európa Társadalomtudományi folyóirat (Taylor)*, No 23. ISSN: 2064-437X. Szeged, Hungary.

Akhmedov E. (2018). Possible Mitigation Measures for Overcoming Negative Consequences of Oil Price Plunges in Oil-Exporting Countries. *The Journal of Business Paradigms*. ISSN: 2584-6612. PAR Business School, Rijeka, Croatia.

15.2. Abstracts in English

Akhmedov E. Migration Processes in the Western Oil-Producing Regions of the Republic of Kazakhstan. *Challenges in national and international economic policies. 2nd Central European PhD Workshop on Economic Policy and Crisis Management*, University of Szeged and European Association for Comparative Economic Studies. Szeged, Hungary. March 2017.

Akhmedov E. Sustainable development as a main development priority in major oil-exporting countries. *Socio-economic, environmental and regional aspects of a circular economy International Conference*, ISBN: 978-963-9899-98-8. Pecs, Hungary. April 2018.

Akhmedov E. Possible mitigation measures for overcoming negative consequences of oil price plunges in oil-exporting countries. *3rd Business and Entrepreneurial Economics International Conference*. ISSN: 2459-5187. Sibenik, Croatia, May-June 2018.

16. Curriculum Vitae

Professional Experience:

2008 - present
Consultant, Edward Austin Ltd. and independent consultant
Consulting services, including information support and market research in the oil and gas and other sectors, preparation of industry development plans, due diligence and business development advice, advice and assistance in government relations.
2007- 2008
Business Development Manager
“Kazstroyservice” JSC, Almaty, Kazakhstan
2006 – 2007
Head of Rail Operations
Agip Kazakhstan North Caspian Operating Company N.V. (Agip KCO), London, UK
2003 – 2006
Business Development Manager
PetroKazakhstan Overseas Services JSC, Almaty, Kazakhstan
2002 – 2003
Deputy Director, Corporate Development Department,
JSC “KazTransOil”, Astana, Kazakhstan
1997 - 2002
Project Officer
Regional Office of the Islamic Development Bank. Almaty, Kazakhstan

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1996-1997 Master's Degree in Energy and Environmental Management and Economics,
Scuola Superiore Enrico Mattei, Milan, Italy, Scholarship from Agip.
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Attachments

Attachment 1. Political and administrative map of Kazakhstan

Source: Global City Map (2017)

Attachment 2. First calculation of the VAR model (without dummies)

VAR system, lag order 4
OLS estimates, observations 2004:2-2016:4 (T = 51)
Log-likelihood = 290.0498
Determinant of covariance matrix = 1.3496438e-010
AIC = -8.7078
BIC = -6.1321
HQC = -7.7236
Portmanteau test: LB(12) = 144.85, df = 128 [0.1465]

Equation 1: d_l_Oilprice

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0444992	0.0636201	0.6995	0.4890	
d_l_Oilprice_1	0.239030	0.217728	1.098	0.2800	
d_l_Oilprice_2	0.0655242	0.354353	0.1849	0.8544	
d_l_Oilprice_3	−0.511578	0.380631	−1.344	0.1878	
d_l_Oilprice_4	−0.214181	0.332557	−0.6440	0.5239	
d_l_CPI_1	−0.269988	1.81577	−0.1487	0.8827	
d_l_CPI_2	0.594859	1.83223	0.3247	0.7474	
d_l_CPI_3	−1.29186	1.75346	−0.7367	0.4663	
d_l_CPI_4	−2.00636	1.66761	−1.203	0.2372	
d_l_Govrev_1	−0.131095	0.209133	−0.6268	0.5349	
d_l_Govrev_2	0.369552	0.216489	1.707	0.0969	*
d_l_Govrev_3	0.392080	0.221623	1.769	0.0858	*
d_l_Govrev_4	−0.0175068	0.205774	−0.08508	0.9327	
d_l_Export_1	−0.119271	0.349209	−0.3415	0.7348	
d_l_Export_2	0.224521	0.375836	0.5974	0.5542	
d_l_Export_3	0.326157	0.359180	0.9081	0.3702	
d_l_Export_4	−0.0893743	0.224252	−0.3985	0.6927	

Mean dependent var	0.009235	S.D. dependent var	0.173785	
Sum squared resid	0.958177	S.E. of regression	0.167874	
R-squared	0.365468	Adjusted R-squared	0.066864	
F(16, 34)	1.223924	P-value(F)	0.300346	
rho	0.025980	Durbin-Watson	1.858622	

F-tests of zero restrictions:
All lags of d_l_Oilprice F(4, 34) = 1.2245 [0.3187]
All lags of d_l_CPI F(4, 34) = 0.70076 [0.5968]
All lags of d_l_Govrev F(4, 34) = 1.5648 [0.2060]
All lags of d_l_Export F(4, 34) = 0.60172 [0.6640]
All vars, lag 4 F(4, 34) = 0.84075 [0.5091]

Equation 2: d_l_CPI

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0167532	0.00637974	2.626	0.0129	**
d_l_Oilprice_1	−0.00792495	0.0218335	−0.3630	0.7189	
d_l_Oilprice_2	0.0319263	0.0355341	0.8985	0.3753	
d_l_Oilprice_3	−0.0728448	0.0381691	−1.908	0.0648	*
d_l_Oilprice_4	−0.0488062	0.0333483	−1.464	0.1525	
d_l_CPI_1	0.297440	0.182083	1.634	0.1116	
d_l_CPI_2	−0.141423	0.183734	−0.7697	0.4468	
d_l_CPI_3	0.0713783	0.175834	0.4059	0.6873	
d_l_CPI_4	−0.0930699	0.167226	−0.5566	0.5815	
d_l_Govrev_1	0.00153990	0.0209716	0.07343	0.9419	
d_l_Govrev_2	0.00521739	0.0217092	0.2403	0.8115	
d_l_Govrev_3	−0.000117022	0.0222241	−0.005266	0.9958	
d_l_Govrev_4	3.57747e-05	0.0206348	0.001734	0.9986	
d_l_Export_1	−0.0311452	0.0350182	−0.8894	0.3800	
d_l_Export_2	0.0533767	0.0376883	1.416	0.1658	
d_l_Export_3	0.0469785	0.0360181	1.304	0.2009	
d_l_Export_4	0.0129666	0.0224877	0.5766	0.5680	

Mean dependent var	0.020920		S.D. dependent var	0.017030
Sum squared resid	0.009635		S.E. of regression	0.016834
R-squared	0.335559		Adjusted R-squared	0.022881
F(16, 34)	1.073178		P-value(F)	0.414719
rho	−0.052012		Durbin-Watson	2.097343

F-tests of zero restrictions:
All lags of d_l_Oilprice F(4, 34) = 1.8698 [0.1384]
All lags of d_l_CPI F(4, 34) = 0.69572 [0.6002]
All lags of d_l_Govrev F(4, 34) = 0.019352 [0.9992]
All lags of d_l_Export F(4, 34) = 1.49 [0.2270]
All vars, lag 4 F(4, 34) = 0.73875 [0.5721]

Equation 3: d_l_Govrev

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0833112	0.0542531	1.536	0.1339	
d_l_Oilprice_1	0.558651	0.185671	3.009	0.0049	***
d_l_Oilprice_2	0.0224540	0.302181	0.07431	0.9412	
d_l_Oilprice_3	0.0392696	0.324589	0.1210	0.9044	
d_l_Oilprice_4	−0.218287	0.283593	−0.7697	0.4468	
d_l_CPI_1	−1.60324	1.54842	−1.035	0.3078	
d_l_CPI_2	0.628720	1.56246	0.4024	0.6899	
d_l_CPI_3	−0.829168	1.49529	−0.5545	0.5829	
d_l_CPI_4	0.0646123	1.42208	0.04544	0.9640	
d_l_Govrev_1	−0.265650	0.178342	−1.490	0.1456	
d_l_Govrev_2	−0.153345	0.184614	−0.8306	0.4120	
d_l_Govrev_3	−0.289457	0.188993	−1.532	0.1349	
d_l_Govrev_4	0.129671	0.175478	0.7390	0.4650	
d_l_Export_1	−0.263343	0.297793	−0.8843	0.3827	
d_l_Export_2	0.330005	0.320500	1.030	0.3104	
d_l_Export_3	−0.0933960	0.306297	−0.3049	0.7623	
d_l_Export_4	0.268581	0.191235	1.404	0.1693	

Mean dependent var	0.036819		S.D. dependent var	0.205369
Sum squared resid	0.696796		S.E. of regression	0.143157
R-squared	0.669580		Adjusted R-squared	0.514088
F(16, 34)	4.306205		P-value(F)	0.000171
rho	0.072009		Durbin-Watson	1.850032

F-tests of zero restrictions:
All lags of d_l_Oilprice F(4, 34) = 2.8001 [0.0412]
All lags of d_l_CPI F(4, 34) = 0.32334 [0.8603]
All lags of d_l_Govrev F(4, 34) = 2.4317 [0.0664]
All lags of d_l_Export F(4, 34) = 1.1612 [0.3451]
All vars, lag 4 F(4, 34) = 0.83955 [0.5098]

Equation 4: d_l_Export

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0427242	0.0362318	1.179	0.2465	
d_l_Oilprice_1	0.891045	0.123997	7.186	<0.0001	***
d_l_Oilprice_2	0.487491	0.201805	2.416	0.0212	**
d_l_Oilprice_3	0.105883	0.216770	0.4885	0.6284	
d_l_Oilprice_4	0.192838	0.189392	1.018	0.3158	
d_l_CPI_1	0.797817	1.03408	0.7715	0.4457	
d_l_CPI_2	0.601740	1.04346	0.5767	0.5680	
d_l_CPI_3	−0.574116	0.998600	−0.5749	0.5691	
d_l_CPI_4	−1.31405	0.949708	−1.384	0.1755	
d_l_Govrev_1	−0.156465	0.119102	−1.314	0.1977	
d_l_Govrev_2	0.0309914	0.123291	0.2514	0.8030	
d_l_Govrev_3	−0.0616404	0.126215	−0.4884	0.6284	
d_l_Govrev_4	−0.0123102	0.117189	−0.1050	0.9170	
d_l_Export_1	−0.572364	0.198875	−2.878	0.0069	***
d_l_Export_2	−0.380744	0.214040	−1.779	0.0842	*
d_l_Export_3	−0.134286	0.204554	−0.6565	0.5159	
d_l_Export_4	−0.0343112	0.127712	−0.2687	0.7898	

Mean dependent var	0.017193		S.D. dependent var	0.162968
Sum squared resid	0.310769		S.E. of regression	0.095605
R-squared	0.765975		Adjusted R-squared	0.655845
F(16, 34)	6.955215		P-value(F)	1.15e-06
rho	−0.016381		Durbin-Watson	1.919456

F-tests of zero restrictions:
All lags of d_l_Oilprice F(4, 34) = 14.52 [0.0000]
All lags of d_l_CPI F(4, 34) = 1.0253 [0.4083]
All lags of d_l_Govrev F(4, 34) = 0.98077 [0.4310]
All lags of d_l_Export F(4, 34) = 2.2412 [0.0851]
All vars, lag 4 F(4, 34) = 0.72306 [0.5823]

For the system as a whole
Null hypothesis: the longest lag is 3
Alternative hypothesis: the longest lag is 4
Likelihood ratio test: Chi-square (16) = 21.7535 [0.1513]

Attachment 3. Tests for the first calculation of the VAR model

Autocorrelation

```
Test for autocorrelation of order up to 4

          Rao F   Approx dist.  p-value
lag 1     1.377    F(16, 83)     0.1736
lag 2     0.870    F(32, 86)     0.6646
lag 3     0.729    F(48, 75)     0.8792
lag 4     0.736    F(64, 60)     0.8858
```

I cannot reject the null-hypothesis of no autocorrelation because p-value is more than 5% for all lags. Having no autocorrelation means that there are consistent estimators as the data are independently distributed.

ARCH test

```
Test for ARCH of order up to 4

           LM       df     p-value
lag 1   104.972    100      0.3472
lag 2   205.535    200      0.3792
lag 3   306.836    300      0.3805
lag 4   415.142    400      0.2904
```

The null hypothesis for ARCH test is the absence of Autoregressive Conditional Heteroskedasticity (ARCH) effect. We cannot reject the null hypothesis at 10%. Having no ARCH effect implies conditional homoscedasticity.

Test for normality of residuals

```
Residual correlation matrix, C (4 x 4)
     1.0000       0.16311     -0.095374      0.63917
     0.16311      1.0000       0.41279       0.12775
    -0.095374     0.41279      1.0000       -0.12092
     0.63917      0.12775     -0.12092       1.0000

 Eigenvalues of C                      Doornik-Hansen test
    0.359803                            Chi-square(8) = 23.5958 [0.0027]
    0.529351
     1.40915
     1.70169
```

This result means that this VAR is not normally distributed because the Doornik-Hansen test shows the p-value less than 5%. So there was a need to include two dummies.

Attachment 4. Second calculation of the VAR model (with dummies)

VAR system, lag order 4
OLS estimates, observations 2004:2-2016:4 (T = 51)
Log-likelihood = 334.25253
Determinant of covariance matrix = 2.3844907e-011
AIC = -10.1276
BIC = -7.2488
HQC = -9.0275
Portmanteau test: LB(12) = 173.497, df = 128 [0.0046]

Equation 1: d_l_Oilprice

	Coefficient	*Std. Error*	*t-ratio*	*p-value*
const	0.0515207	0.0658314	0.7826	0.4396
d_l_Oilprice_1	0.240020	0.225231	1.066	0.2946
d_l_Oilprice_2	0.100436	0.367825	0.2731	0.7866
d_l_Oilprice_3	−0.465998	0.396213	−1.176	0.2482
d_l_Oilprice_4	−0.167749	0.344184	−0.4874	0.6293
d_l_CPI_1	−0.511993	1.89150	−0.2707	0.7884
d_l_CPI_2	0.555848	1.87367	0.2967	0.7686
d_l_CPI_3	−1.20165	1.78690	−0.6725	0.5061
d_l_CPI_4	−2.01456	1.74287	−1.156	0.2563
d_l_Govrev_1	−0.135266	0.212651	−0.6361	0.5292
d_l_Govrev_2	0.359616	0.221181	1.626	0.1138
d_l_Govrev_3	0.363566	0.227606	1.597	0.1200
d_l_Govrev_4	−0.0649642	0.216441	−0.3001	0.7660
d_l_Export_1	−0.141458	0.360808	−0.3921	0.6976
d_l_Export_2	0.166762	0.388765	0.4290	0.6708
d_l_Export_3	0.257035	0.372498	0.6900	0.4951
d_l_Export_4	−0.0771937	0.228516	−0.3378	0.7377
d1	0.166126	0.188808	0.8799	0.3855
d2	−0.0566068	0.208397	−0.2716	0.7877

Mean dependent var	0.009235		S.D. dependent var	0.173785
Sum squared resid	0.931799		S.E. of regression	0.170642
R-squared	0.382936		Adjusted R-squared	0.035838
F(18, 32)	1.103250		P-value(F)	0.392219
rho	0.009545		Durbin-Watson	1.880560

F-tests of zero restrictions:
All lags of d_l_Oilprice F(4, 32) = 1.0661 [0.3893]
All lags of d_l_CPI F(4, 32) = 0.65512 [0.6276]
All lags of d_l_Govrev F(4, 32) = 1.4517 [0.2399]

All lags of d_l_Export F(4, 32) = 0.39587 [0.8101]
All vars, lag 4 F(4, 32) = 0.75256 [0.5637]

Equation 2: d_l_CPI

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0134639	0.00306786	4.389	0.0001	***
d_l_Oilprice_1	0.0121219	0.0104961	1.155	0.2567	
d_l_Oilprice_2	0.00804764	0.0171413	0.4695	0.6419	
d_l_Oilprice_3	−0.0302195	0.0184642	−1.637	0.1115	
d_l_Oilprice_4	−0.0193623	0.0160396	−1.207	0.2362	
d_l_CPI_1	0.0943346	0.0881473	1.070	0.2925	
d_l_CPI_2	−0.0538430	0.0873163	−0.6166	0.5418	
d_l_CPI_3	0.0490071	0.0832728	0.5885	0.5603	
d_l_CPI_4	0.0977581	0.0812209	1.204	0.2376	
d_l_Govrev_1	−0.00079260	0.00990988	−0.07998	0.9367	
d_l_Govrev_2	0.0125820	0.0103074	1.221	0.2311	
d_l_Govrev_3	0.000167925	0.0106068	0.01583	0.9875	
d_l_Govrev_4	−0.0211205	0.0100865	−2.094	0.0443	**
d_l_Export_1	−0.00690424	0.0168142	−0.4106	0.6841	
d_l_Export_2	0.0234641	0.0181171	1.295	0.2045	
d_l_Export_3	0.0268608	0.0173590	1.547	0.1316	
d_l_Export_4	0.0107689	0.0106492	1.011	0.3195	
d1	0.0672060	0.00879875	7.638	<0.0001	***
d2	0.0836278	0.00971165	8.611	<0.0001	***

Mean dependent var	0.020920		S.D. dependent var	0.017030
Sum squared resid	0.002024		S.E. of regression	0.007952
R-squared	0.860453		Adjusted R-squared	0.781959
F(18, 32)	10.96190		P-value(F)	4.94e-09
rho	0.037700		Durbin-Watson	1.866777

F-tests of zero restrictions:
All lags of d_l_Oilprice F(4, 32) = 1.9018 [0.1343]
All lags of d_l_CPI F(4, 32) = 1.0065 [0.4186]
All lags of d_l_Govrev F(4, 32) = 1.696 [0.1752]
All lags of d_l_Export F(4, 32) = 1.0698 [0.3876]
All vars, lag 4 F(4, 32) = 2.2097 [0.0901]

Equation 3: d_l_Govrev

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0609599	0.0510870	1.193	0.2415	
d_l_Oilprice_1	0.648465	0.174785	3.710	0.0008	***
d_l_Oilprice_2	−0.122781	0.285442	−0.4301	0.6700	
d_l_Oilprice_3	0.184159	0.307472	0.5989	0.5534	
d_l_Oilprice_4	−0.134046	0.267096	−0.5019	0.6192	
d_l_CPI_1	−2.26731	1.46786	−1.545	0.1323	
d_l_CPI_2	1.06703	1.45402	0.7338	0.4684	
d_l_CPI_3	−1.02618	1.38669	−0.7400	0.4647	
d_l_CPI_4	0.938232	1.35252	0.6937	0.4929	
d_l_Govrev_1	−0.271801	0.165023	−1.647	0.1093	
d_l_Govrev_2	−0.109433	0.171643	−0.6376	0.5283	
d_l_Govrev_3	−0.257942	0.176629	−1.460	0.1539	
d_l_Govrev_4	0.0840818	0.167964	0.5006	0.6201	
d_l_Export_1	−0.129954	0.279997	−0.4641	0.6457	
d_l_Export_2	0.255646	0.301693	0.8474	0.4031	
d_l_Export_3	−0.111315	0.289069	−0.3851	0.7027	
d_l_Export_4	0.245709	0.177335	1.386	0.1755	
d1	0.128531	0.146520	0.8772	0.3869	
d2	0.439044	0.161722	2.715	0.0106	**

Mean dependent var	0.036819	S.D. dependent var	0.205369	
Sum squared resid	0.561147	S.E. of regression	0.132423	
R-squared	0.733904	Adjusted R-squared	0.584226	
F(18, 32)	4.903198	P-value(F)	0.000047	
rho	−0.013782	Durbin-Watson	2.016195	

F-tests of zero restrictions:
All lags of d_l_Oilprice F(4, 32) = 4.0968 [0.0086]
All lags of d_l_CPI F(4, 32) = 0.68091 [0.6103]
All lags of d_l_Govrev F(4, 32) = 2.3555 [0.0747]
All lags of d_l_Export F(4, 32) = 0.86849 [0.4935]
All vars, lag 4 F(4, 32) = 0.92471 [0.4618]

Equation 4: d_l_Export

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0413713	0.0375677	1.101	0.2790	
d_l_Oilprice_1	0.907306	0.128531	7.059	<0.0001	***
d_l_Oilprice_2	0.474730	0.209905	2.262	0.0306	**
d_l_Oilprice_3	0.148418	0.226105	0.6564	0.5163	
d_l_Oilprice_4	0.224956	0.196414	1.145	0.2606	
d_l_CPI_1	0.590597	1.07942	0.5471	0.5881	
d_l_CPI_2	0.664847	1.06924	0.6218	0.5385	
d_l_CPI_3	−0.575545	1.01972	−0.5644	0.5764	
d_l_CPI_4	−1.16249	0.994597	−1.169	0.2511	
d_l_Govrev_1	−0.159100	0.121352	−1.311	0.1992	
d_l_Govrev_2	0.0350796	0.126220	0.2779	0.7829	
d_l_Govrev_3	−0.0666322	0.129887	−0.5130	0.6115	
d_l_Govrev_4	−0.0379684	0.123515	−0.3074	0.7605	
d_l_Export_1	−0.556982	0.205900	−2.705	0.0109	**
d_l_Export_2	−0.415312	0.221855	−1.872	0.0704	*
d_l_Export_3	−0.163077	0.212571	−0.7672	0.4486	
d_l_Export_4	−0.0338439	0.130406	−0.2595	0.7969	
d1	0.0843210	0.107746	0.7826	0.4396	
d2	0.0567152	0.118925	0.4769	0.6367	

Mean dependent var	0.017193	S.D. dependent var	0.162968	
Sum squared resid	0.303448	S.E. of regression	0.097379	
R-squared	0.771488	Adjusted R-squared	0.642949	
F(18, 32)	6.002007	P-value(F)	5.90e-06	
rho	0.001689	Durbin-Watson	1.875743	

F-tests of zero restrictions:
All lags of d_l_Oilprice F(4, 32) = 14.076 [0.0000]
All lags of d_l_CPI F(4, 32) = 0.77788 [0.5478]
All lags of d_l_Govrev F(4, 32) = 0.92807 [0.4600]
All lags of d_l_Export F(4, 32) = 2.0558 [0.1100]
All vars, lag 4 F(4, 32) = 0.68486 [0.6077]

For the system as a whole
Null hypothesis: the longest lag is 3
Alternative hypothesis: the longest lag is 4
Likelihood ratio test: Chi-square(16) = 29.4913 [0.0208]

Attachment 5. Tests for the second calculation of the VAR model

Autocorrelation

```
Test for autocorrelation of order up to 4
          Rao F   Approx dist.  p-value
lag 1     0.960    F(16, 83)     0.5064
lag 2     1.094    F(32, 86)     0.3625
lag 3     1.160    F(48, 75)     0.2781
lag 4     1.496    F(64, 60)     0.0585
```

I cannot reject the null-hypothesis of no autocorrelation because p-value is more than 5% for all lags. Having no autocorrelation means that there are consistent estimators as the data are independently distributed.

ARCH test

```
Test for ARCH of order up to 4
           LM       df     p-value
lag 1    81.732    100      0.9086
lag 2   195.530    200      0.5760
lag 3   319.684    300      0.2079
lag 4   417.181    400      0.2668
```

The null hypothesis for ARCH test is the absence of ARCH effect. We cannot reject the null hypothesis at 10%. Having no ARCH effect implies conditional homoscedasticity. In statistics, a sequence or a vector of random variables is homoscedastic if all random variables in the sequence or vector have the same finite variance.

Test for normality of residuals

```
Residual correlation matrix, C (4 x 4)

      1.0000      0.24022     -0.10196      0.63894
     0.24022       1.0000      0.14476   -0.0029917
    -0.10196      0.14476       1.0000     -0.19076
     0.63894   -0.0029917     -0.19076       1.0000

Eigenvalues of C                          Doornik-Hansen test
                                          Chi-square(8) = 4.26615 [0.8323]
   0.315886
   0.783691
    1.17892
    1.72151
```

This result means that this VAR is normally distributed as the Doornik-Hansen test shows the p-value exceeding 5%. This is the result of including two dummies.

Attachment 6. Forecast variance decomposition

Decomposition of variance for d_l_Oilprice

period	std. error	d_l_Oilprice	d_l_CPI	d_l_Govrev	d_l_Export
1	0.135169	100.0000	0.0000	0.0000	0.0000
2	0.138561	98.7236	0.0770	0.8547	0.3447
3	0.144503	90.7719	0.3695	7.6839	1.1747
4	0.148453	86.1416	0.6136	11.8614	1.3834
5	0.149526	84.9110	1.6479	11.9775	1.4636
6	0.151403	83.5249	1.7368	13.1850	1.5533
7	0.152048	83.6175	1.7228	13.1048	1.5549
8	0.152491	83.1324	1.7210	13.6002	1.5465
9	0.152881	83.0939	1.7164	13.5393	1.6505
10	0.152959	83.0126	1.7146	13.6237	1.6490
11	0.152996	82.9741	1.7183	13.6275	1.6801
12	0.153094	82.8708	1.7164	13.7270	1.6858
13	0.153115	82.8611	1.7183	13.7235	1.6971
14	0.153147	82.8277	1.7187	13.7568	1.6968
15	0.153152	82.8249	1.7186	13.7579	1.6987
16	0.153166	82.8100	1.7186	13.7721	1.6993
17	0.153173	82.8082	1.7185	13.7710	1.7023
18	0.153175	82.8057	1.7185	13.7735	1.7023
19	0.153176	82.8053	1.7185	13.7736	1.7026
20	0.153179	82.8028	1.7185	13.7756	1.7032

Decomposition of variance for d_l_CPI

period	std. error	d_l_Oilprice	d_l_CPI	d_l_Govrev	d_l_Export
1	0.00629909	5.7705	94.2295	0.0000	0.0000
2	0.0065083	10.3653	89.2606	0.0019	0.3722
3	0.00698312	15.2317	77.8884	2.3018	4.5781
4	0.00712912	16.2782	74.7571	2.5003	6.4643
5	0.00737364	15.2270	70.4885	8.2415	6.0430
6	0.0074445	15.9019	69.2859	8.1335	6.6788
7	0.00747247	15.8111	69.0802	8.4011	6.7077
8	0.00748668	15.7514	68.8778	8.3915	6.9793
9	0.00753508	15.8616	68.0288	8.9893	7.1203
10	0.00756726	16.4727	67.5102	8.9131	7.1040
11	0.00757999	16.4175	67.2861	9.1799	7.1165
12	0.00758421	16.4377	67.2265	9.1884	7.1474
13	0.00759959	16.4565	66.9549	9.4079	7.1808
14	0.00760621	16.5805	66.8565	9.3945	7.1685
15	0.00760885	16.5698	66.8103	9.4495	7.1704
16	0.00761001	16.5697	66.7920	9.4662	7.1721
17	0.00761448	16.5826	66.7140	9.5212	7.1822
18	0.00761642	16.6181	66.6827	9.5186	7.1807
19	0.00761698	16.6169	66.6729	9.5300	7.1803
20	0.00761733	16.6154	66.6669	9.5373	7.1803

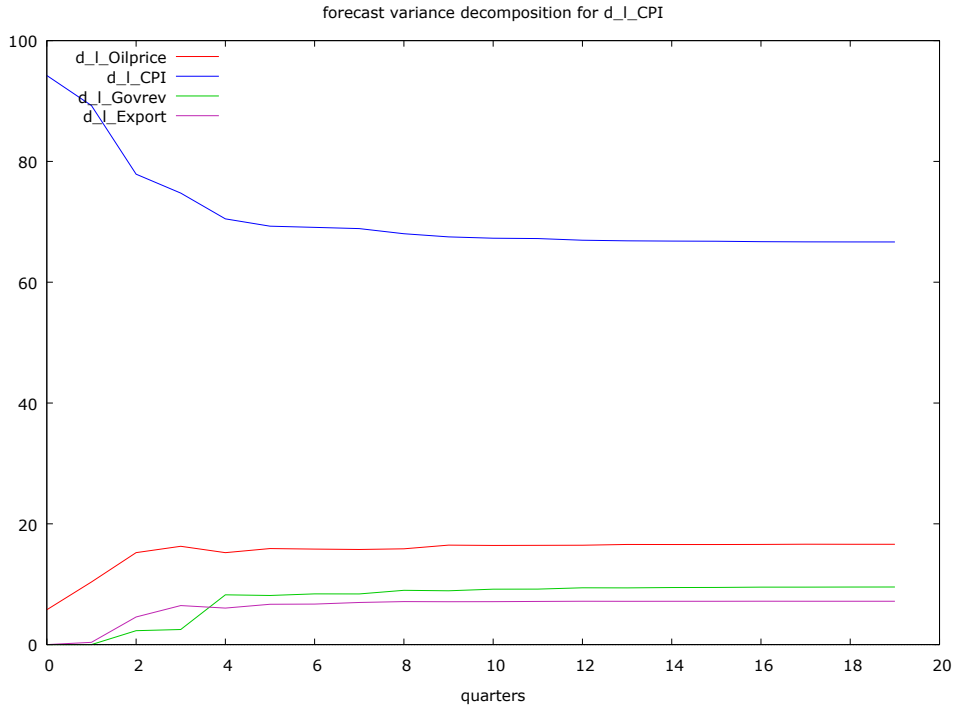
Decomposition of variance for d_l_Govrev

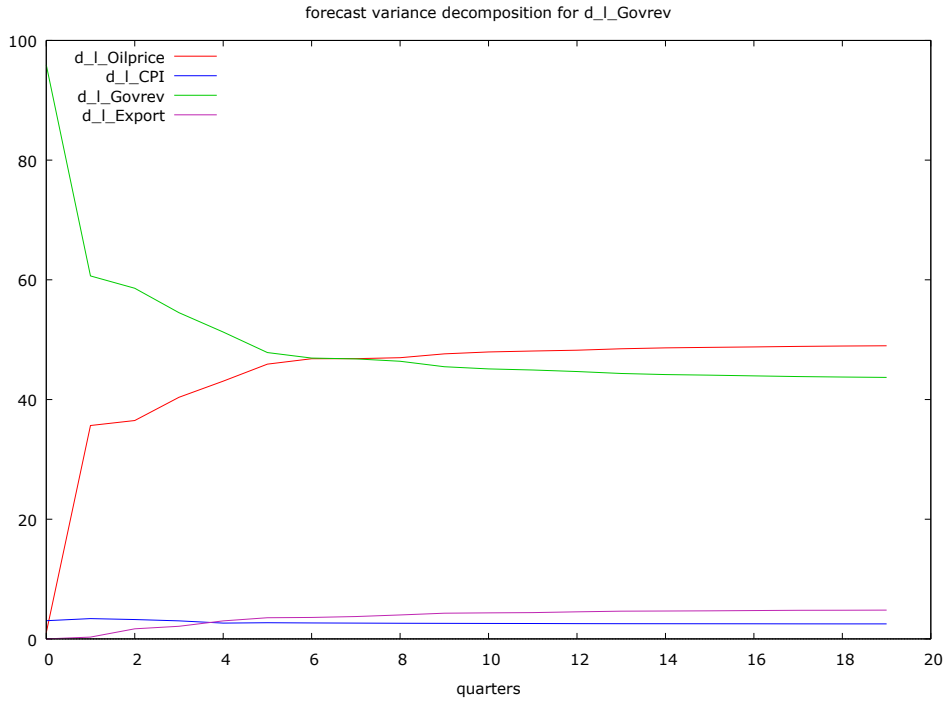
period	std. error	d_l_Oilprice	d_l_CPI	d_l_Govrev	d_l_Export
1	0.104895	1.0395	3.0400	95.9205	0.0000
2	0.136369	35.6554	3.3930	60.6512	0.3004
3	0.139717	36.4900	3.2382	58.5874	1.6844
4	0.144853	40.3702	3.0137	54.5081	2.1081
5	0.155139	43.0675	2.6434	51.2762	3.0128
6	0.160815	45.9137	2.7016	47.8482	3.5365
7	0.162587	46.8171	2.6667	46.9290	3.5872
8	0.163578	46.8267	2.6451	46.7932	3.7349
9	0.166289	46.9889	2.6133	46.3953	4.0025
10	0.168086	47.6277	2.6009	45.4767	4.2946
11	0.168766	47.9480	2.5831	45.1176	4.3514
12	0.169449	48.1043	2.5685	44.9313	4.3958
13	0.170438	48.2397	2.5547	44.6789	4.5266
14	0.171131	48.4774	2.5424	44.3496	4.6306
15	0.171501	48.6321	2.5336	44.1716	4.6627
16	0.171849	48.7143	2.5279	44.0690	4.6888
17	0.172228	48.7870	2.5220	43.9530	4.7380
18	0.172506	48.8741	2.5166	43.8321	4.7772
19	0.172688	48.9391	2.5131	43.7541	4.7937
20	0.172854	48.9812	2.5107	43.6997	4.8085

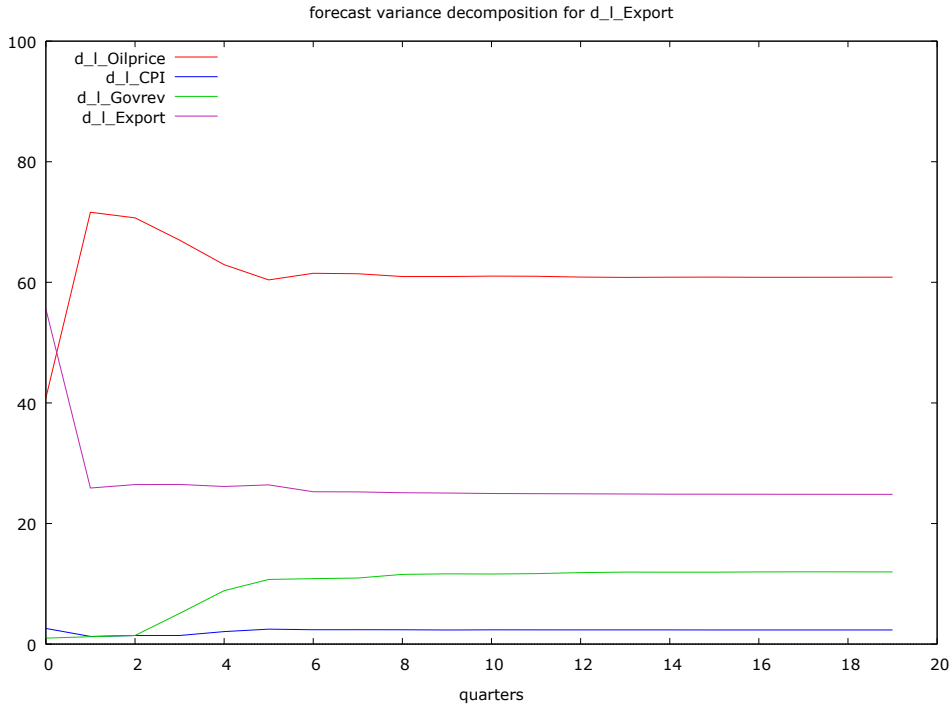
Decomposition of variance for d_l_Export

period	std. error	d_l_Oilprice	d_l_CPI	d_l_Govrev	d_l_Export
1	0.077136	40.8238	2.5984	0.9913	55.5865
2	0.129389	71.6226	1.2710	1.2221	25.8844
3	0.13025	70.6936	1.4170	1.4296	26.4598
4	0.134265	67.0041	1.4247	5.0959	26.4752
5	0.138612	62.9315	2.0732	8.8574	26.1379
6	0.141672	60.3981	2.4767	10.7166	26.4086
7	0.144916	61.4979	2.3817	10.8551	25.2652
8	0.145023	61.4212	2.3859	10.9527	25.2402
9	0.14557	60.9607	2.3770	11.5601	25.1022
10	0.14667	60.9560	2.3421	11.6480	25.0539
11	0.146965	61.0307	2.3624	11.6292	24.9777
12	0.147062	61.0047	2.3593	11.6838	24.9521
13	0.147262	60.8692	2.3536	11.8549	24.9224
14	0.147535	60.8131	2.3504	11.9361	24.9004
15	0.147662	60.8542	2.3486	11.9295	24.8677
16	0.14768	60.8619	2.3484	11.9276	24.8621
17	0.147749	60.8327	2.3464	11.9700	24.8508
18	0.147844	60.8319	2.3445	11.9801	24.8435
19	0.147884	60.8467	2.3439	11.9739	24.8354
20	0.147896	60.8521	2.3437	11.9720	24.8322

Attachment 7. Forecast variance decomposition






forecast variance decomposition for d_l_Export
d_l_Oilprice
d_l_CPI
d_l_Govrev
d_l_Export
100
80
60
40
20
0
0
2
4
6
8
10
12
14
16
18
20
quarters