

University of Economics, Prague

**Faculty of Economics**

Major Field of Study: Economics and Economic Administration



# CRUDE OIL AND ITS ECONOMIC EFFECTS ON RUSSIA

*Bachelor thesis*

Author: Anton Gryzunov

Thesis supervisor: Ing. Helena Chytilová, Ph.D., M.A.

Year: 2015

I declare that I have written this bachelor thesis on my own, using reliable and appropriate sources I have referred to.

Anton Gryzunov

26.12.2015, Prague

I would like to thank my supervisor Helena Chytilová for significant support and usefull hints for my bachelor thesis.

## **Abstract**

This thesis examines the impact of oil Brent price changes on real GDP of Russian Federation. In order to evaluate the effect of oil price shocks and changes on real GDP the quarterly data for the period 2003 (Q1) – 2015 (Q1) were used. The empirical analysis was also made using additional five explanatory variables: real personal consumption expenditures, real long-term interest rate, unemployment, consumer price index and index of industrial production. The variables were put into the regression model in the form of differences. With help of regression analysis it was concluded that there is positive relationship between real GDP and Brent oil price. Also the positive dependence was found between real GDP and both index of industrial production and real personal consumption expenditures. On the other hand the relationship between long-term interest rate and real GDP was negative. Unemployment rate and consumer price index were not significant and had negative dependence with real GDP. The aforementioned hypothesis about the negative relationship between GDP and price of oil was confirmed in line with initial theoretical predictions based on detailed review of Russian economy.

**Key Words:** Oil Price Shocks, World Oil Market, International Trade, Russian Economy

**JEL:** C32, E62, F19, F29, O13, O57, Q43.

# Table of Contents

|                                                                                     |           |
|-------------------------------------------------------------------------------------|-----------|
| <b>Introduction .....</b>                                                           | <b>1</b>  |
| <b>1. General Theoretical Determination about Oil and its Price Formation .....</b> | <b>2</b>  |
| <b>1.1 Oil Supply.....</b>                                                          | <b>3</b>  |
| 1.1.1 OPEC Oil Supply.....                                                          | 4         |
| 1.1.2 Non-OPEC Oil Supply .....                                                     | 6         |
| <b>1.2 Oil Demand.....</b>                                                          | <b>7</b>  |
| <b>1.3 Financial Markets Factors .....</b>                                          | <b>9</b>  |
| 1.3.1 Oil Prices and Futures Market .....                                           | 10        |
| <b>1.4 Oil Inventories and Oil Prices .....</b>                                     | <b>11</b> |
| <b>2. General Determination of Oil Shocks and its Economic Effects.....</b>         | <b>11</b> |
| <b>2.1 Short Historical Review of Oil Shocks Factors.....</b>                       | <b>13</b> |
| <b>2.2 Oil Price Shocks and their Effect on Economic Growth.....</b>                | <b>14</b> |
| <b>2.3 Oil Price Shocks and Oil-Importing Countries .....</b>                       | <b>15</b> |
| <b>2.4 Oil Price Shocks and Oil-Exporting Countries.....</b>                        | <b>18</b> |
| 2.4.1 Oil Price Shocks and Fiscal Policy.....                                       | 20        |
| 2.4.2 Oil Price Shocks and Exchange rates .....                                     | 23        |
| <b>3. Economic Review of Russian Economy .....</b>                                  | <b>25</b> |
| <b>3.1. Oil Price Shocks and Russian Economy.....</b>                               | <b>28</b> |
| <b>4. Empirical Part .....</b>                                                      | <b>31</b> |
| <b>4.1 Methodology .....</b>                                                        | <b>31</b> |
| 4.1.1 Hypothesis .....                                                              | 31        |
| 4.1.2 Data.....                                                                     | 31        |
| 4.1.3 Seasonality.....                                                              | 33        |
| 4.1.4 Stationarity.....                                                             | 33        |
| <b>4.2 Analysis .....</b>                                                           | <b>34</b> |
| 4.2.1 Econometric verification .....                                                | 35        |

|                                                |    |
|------------------------------------------------|----|
| 4.2.2 Statistical verification .....           | 35 |
| 4.3 Interpretation of Results .....            | 38 |
| 4.4 Potential Drawbacks and Improvements ..... | 41 |
| Conclusion .....                               | 41 |
| References.....                                | 42 |

## Introduction

Analysis of economic effects of oil, world oil price dynamics and oil market conjuncture can be estimated as a very specific and difficult phenomenon, ambiguously interpreted by different experts. Oil and its trading are one of the most important backgrounds for international relations and also can be a significant reason for conflicts and the economic recessions. In the thesis the conception of “oil” should be understood as “crude oil”.

Characterizing oil as a “good” it is worth to notice, that oil is interpreted as a good for which demand is inelastic. It has no close substitutes in comparison with foodstuffs or cars. But the crucial point is to understand that the equilibrium on the world crude oil market is very sensitive, which means that every movement of supply and demand can significantly influence the crude oil prices and accordingly the economy of countries, which are dependent on oil policy movements. In such case, Russia is presented in this paper as an “oil economic country”. Today the natural wealth emphasizes the crucial role of the Russian Federation in international trade, because the crude oil reserves either enable the country to satisfy all inner economic, social needs and to sell substantial share abroad. Russian oil industry is diversified system that determines successful role of the country worldwide.

For the last 25 years, Russia, which plays a crucial role on the crude oil production market worldwide, exhibited many dramatic economic changes: starting from economic collapses in 1990s through very serious booms in New Century.

The most inspiring motive for writing this paper was the contemporary events, related to negative oil price shock. This problem is very interesting and actual nowadays, because the OPEC cartels decisions, production policy of USA and slow growth of the world economy during last 7 years turned (for instance) the Brent oil price down from 108 dollars per barrel in the first quarter 2014 up to 47 dollars per barrel in the third quarter 2015<sup>1</sup>. Based on this development, the main hypothesis of this paper arises, whether oil price changes have positive impact on the real GDP of Russian Federation, since this country was chosen as the main case by investigating world oil market. The paper will try to make distinctive analysis of the main country’s economic exhibitions, entailed both by oil prices volatility and shocks and main events on the world oil market during the last 15 years or even more. But before doing this, it is desirable to look in detail on oil development issues, emphasizing emphasizing all crucial components so as not to miss the main logic behind the nature

---

<sup>1</sup> The data was taken from Federal Reserve Bank of St. Louis (2015)

of oil market and oil prices. The paper will consist of four main parts and its sub-parts accordingly. The first part is going to introduce oil market itself. The main factors will be described, which can be important for oil price-setting mechanism and oil price changes from the world perspective. The second part is going to deal with conception and nature of oil price shocks, describing its determination, influential factors of their occurrence and its effect on the economic growth of two distinguished groups of countries: oil-importers and oil-exporters. It is important thing to understand and distinguish them, because this thesis tries to cover all relevant and crucial details. The third rather analytical part outlines the main hypothesis. Additionally, attention will be paid to the nature of Russian economy and its important features. Moreover this part will provide the description and prerequisites for different oil price shocks, particularly more for negative ones and simple statistical description of Russian real GDP. The last part is devoted to verification of the main hypothesis of the paper, by making empirical econometric analysis to prove or reject the dependence between oil prices and real GDP of Russia. Despite crucial importance of negative oil price shocks, based on author's initial assumption, the possible effect of positive oil price shocks will be also discussed.

## **1. General Theoretical Determination about Oil and its Price Formation**

Crude oil is a very sophisticated component of energy sector worldwide. For every industrialized country it is a crucial point for economic development. Thus, oil price fluctuations have considerable consequences on economic activity. These consequences vary to large magnitudes, which can have the different effects on oil-importing and oil-exporting countries. For example, according to Jiménez-Rodríguez (2004, p.7), the transmission mechanism, through which oil prices have effects on real economic activity of oil-importing countries are oil supply and demand. The supply side effects imply the oil as a basic input to production and obviously the increase in oil prices leads to a rise of production costs, which induces firms to produce less of output. The demand side effect has its influence upon consumption and investment. Consumption is affected indirectly, due to its positive relation with disposable income. The investment could be negatively effected by oil prices, because of increase of the firms' costs.

Oil prices can really matter for the economy in different ways. Sill (2007, p.21) considers that changes in oil prices directly affect transportations costs, heating bills and the prices of goods made

of petroleum products. It is quite complicated to make precise forecasts about oil prices activities, which entails great uncertainty about the future and can lead the firms and households to delay their purchases and investments. Oil price fluctuations can also lead to reallocation of labor and capital between energy and non-energy sectors of economy. According to these reasons, various countries can exhibit oil shocks in different ways, as it happened not once. It depends how the country is involved in production of oil and in international oil trade.

The world prices of oil are very specific and sophisticated part of macroeconomics, which requires to be analyzed very deeply and carefully. According to Bobylev (2006, p.7), the world prices of oil, forming under global supply and demand of oil can affect global supply and demand inversely. Very high oil prices restrain the economic growth and suppress demand. Simultaneously, very high oil prices can stimulate the increase of oil production in regions with high costs of this production. As a result, when demand is restrained and supply is increased - the prerequisites for decreasing the world oil prices occur. Conversely, when the world oil prices too low, demand is more stimulated, whereas the supply is decreased, due to decreasing of oil production and investments in regions with high production costs. Such situations create the prerequisites for increasing the world oil prices. Of course, all these changes in oil prices, as was written before, can influence the different countries in different ways.

The process of price formation is very extensive but the most important factors are: supply, demand, inventories, markets of oil futures and their behavior. It is required to look at these factors, which influence the oil prices volatility and oil world market more deeply.

## **1.1 Oil Supply**

It is important to bear in mind that crude oil is a finite product. The world oil supply is defined both by oil products demand and the same factors, which form this demand. Simultaneously, the volume of extraction and supply is affected by geological and technological factors, which demonstrate the size and characteristics of production and searching of oil fields. The geological and technological factors in oil-producing countries considered as the main indicators to be comparatively productive on the world oil market. These factors express both quantitative and qualitative characteristics of geological oil reserves and existing technological abilities for extraction. Geological and technical components are interrelated, because the technical progress is able to change objective geological

boundaries as it leads to technological expansion and enhanced oil extraction.

Moreover the oil supply can be influenced by governmental policy of an oil-producing country, OPEC decisions and also by different factors such as military actions in producing countries, weather cataclysms and international sanctions. There were many historical examples, which really affected the oil supply of a country. The concrete instance can be the Iranian Revolution in October 1978, where Iranian production fell from 6.0 millions barrels a day in September 1978 to 0.4 millions barrels a day in January 1979 (Hamilton 1986, p.111).

Bobylev (2006, p.39) distinguishes additional factors, which can play an important role in forming the oil supply: strategic behavior of oil-producing companies and world level of oil prices. Frequently in countries, where private oil-producing companies prevail in the oil sector of economy, current extraction is determined by personal decisions of these producers, who are constrained by technological and economic boundaries. Simultaneously, oil prices are important for supply, because they affect extraction through producers' decisions. The level of oil prices has sufficient impact both on companies' revenue and financial abilities for investments. Bushuev et al (2013, p.81) state, that decreasing of oil prices leads to decreasing of investment level due to lower expected profitability and budget constrains. But at the same time, lower oil prices can stimulate the firms to decrease production costs and production technology enhancements, which can entail investment opportunities and consequently rise in oil extraction.

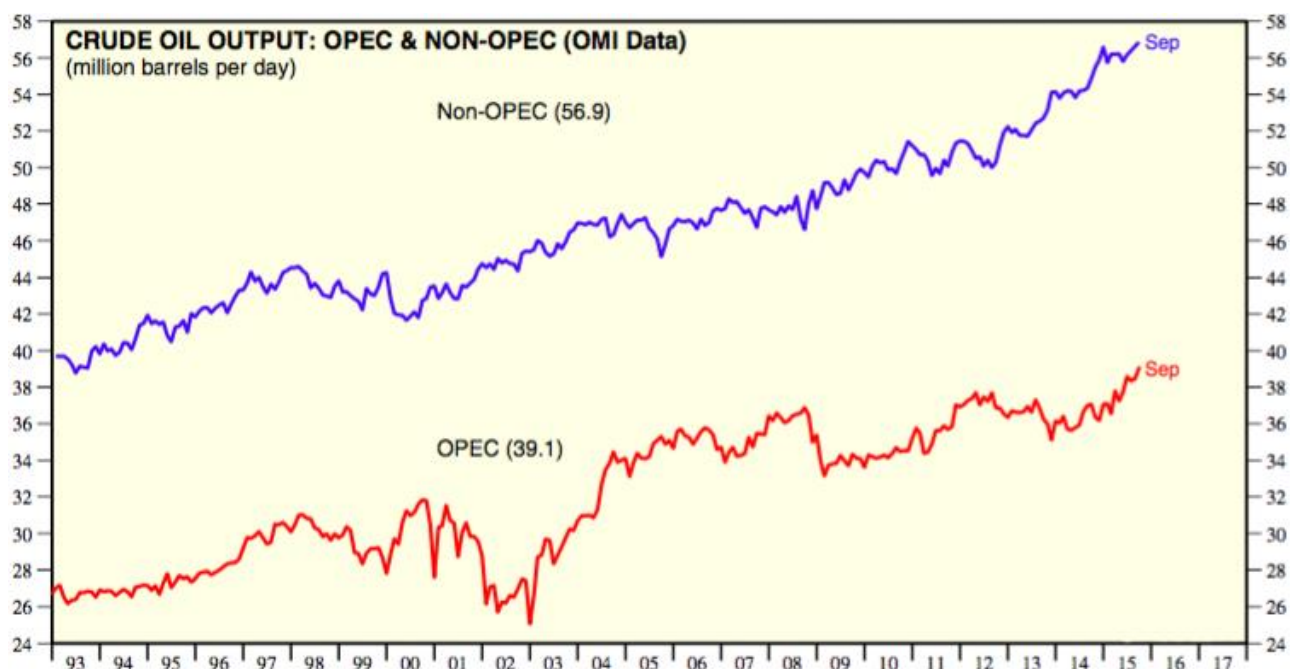
### **1.1.1 OPEC Oil Supply**

Crude oil and its economic attributes can be regulated not only in terms of one specific country. Crude oil as a resource can be coordinated and controlled by the union of oil-producing countries. Typical example of such type of union might be the Organization of the Petroleum exporting countries (OPEC). Now the cartel consists of 12 countries: Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, Venezuela.

The OPEC world supply is enormous, what can be seen on the chart below:

## Chart 1.1 OPEC Crude Oil Output

Source: Oil Market Intelligence (2015)



The OPEC oil supply amounts for 39,1% of the whole world supply with more than 38 millions of barrels produced per day in Q3 2015, which is almost the half of the whole world oil supply. In the period 2001-2002 OPEC exhibited production decline, which was attributable to production cuts undertaken by Member Countries in order to restore balance on the world market after 11<sup>th</sup> September 2001. The cartel was able to increase its oil production from 27 millions of barrels per day in 1993 up to 39 millions of barrels per day in Q3 2015, what counts for 44 % increase<sup>2</sup>. This demonstrates the power of this organization in terms of its ability to affect economically other countries worldwide. OPEC countries can fluctuate the world oil prices by setting up the production quotas for output to increase profits. Therefore Vasiljeva (2012, p.583) finds out that, when the oil prices are too low - the oil is oversupplied and cartel can decrease the production quotas to increase the oil prices. Conversely can be observed, when the oil prices are too high – the supply is low: in this case OPEC can increase the production quotas and consequently decrease the oil prices. These methods can be sufficient to control and stabilize oil prices. That's why the production capacities are very important aspect of OPEC oil policy. Among other things, OPEC is not negatively affected by

---

<sup>2</sup> Data was taken from Oil Market Intelligence (2015)

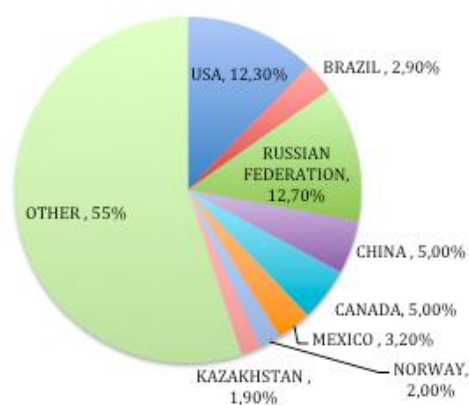
lower prices of oil, which makes it possible to work on profitable basis, whereas some export countries as Russia can suffer, which will be explored further.

### 1.1.2 Non-OPEC Oil Supply

Besides OPEC, there are also some important crude oil productive countries, which possess sufficient oil reserves, high production shares and have substantial role in world exports. This section presents the biggest non-OPEC oil producers, outlined in the chart below.

**Chart 1.2 Share of Oil Production by Non-OPEC Countries**

*Source: British Petroleum (2014)*



This chart represents the countries with production share more than 1% of the whole world production, taken from British Petroleum database. According to the chart, altogether these non-OPEC countries contribute to the whole world production share almost by half of it. The most significant oil producers on the chart are USA and Russian Federation, which together share the oil production of 25% of the world in 2014. Russia, as the main oil player on the world market and as the country examined in this paper, has increased its oil production from 9,3 millions of barrels per day in 2004 up to 10,8 millions of barrels per day in 2014, in other words by 16,1%. This fact says that Russia is always increasing its technological potential, which enables the country being one of the most significant oil suppliers in the world, by extracting and producing more of crude oil for consumption, export and other purposes.

## 1.2 Oil Demand

The oil demand is another factor, which vastly affects the level of oil prices and world oil market. It can be identified as consumption of crude oil, crude oil imports and additionally as consumption of crude oil based products. The oil demand is determined and influenced primarily by growth rate of world economy and also by other factors: structural characteristics of oil demand, energy and oil intensity, weather conditions, efficacy level of energy-consuming technologies and relative competitiveness of substitutive fuel type (Bobylev 2006, p.20). Dale (2015, p.2) emphasizes, that oil demand curve is steep, what means that it is very price inelastic, because of few substitutes.

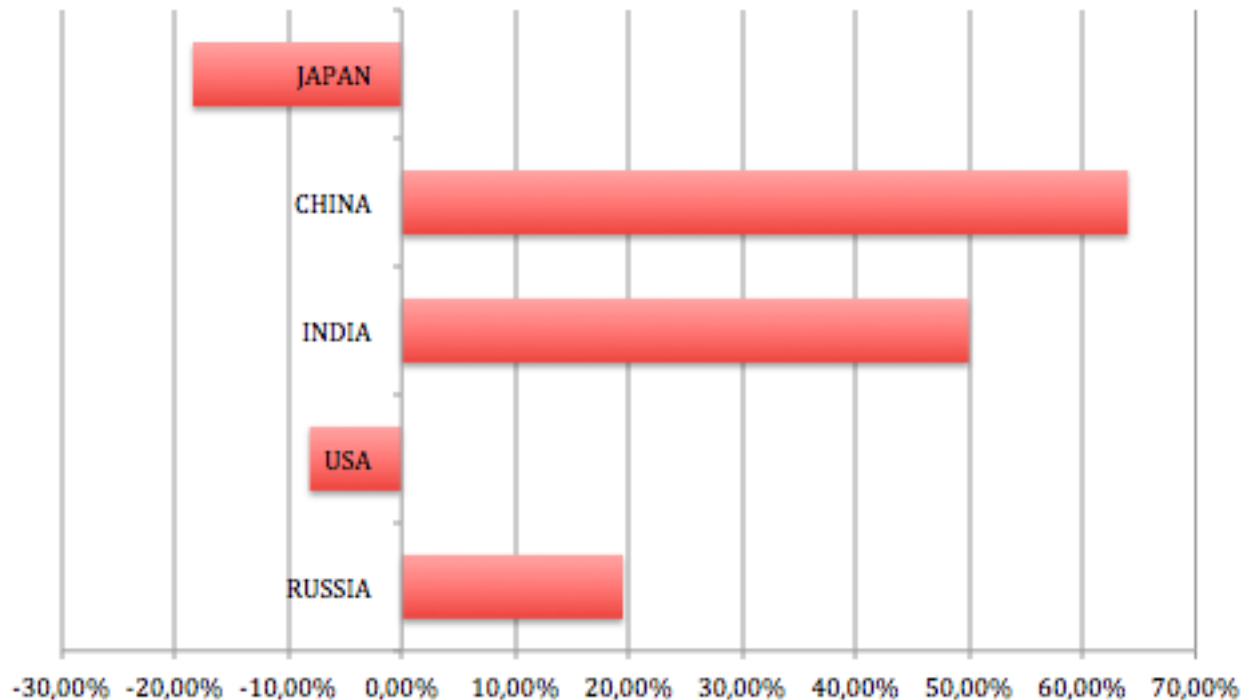
During the last 35 years, the oil demand composition has changed a lot. Kutasovic (2012, p.8) claims that all future growth in consumption will be redistributed from advanced countries to developing countries. Increasing oil demand from developing countries will put pressure on world oil prices, if the consumption growth from developed countries stays really slow as it is now. The author finds the prerequisites for such phenomena, according to the historical statistics. Advanced economies in USA, Russia, Europe and Japan account for half of the world oil demand. But the share of oil consumption in such developed economies has declined from 62,2% in 1980 to 49,9% in 2010 (Kutasovic 2012, p.13). The problem is changing of consumption growth, which comes from emerging economies, especially from Asian regions. The increasing economic growth and developing manufacturing, agricultural and transportation area will enable the developing countries to have the larger piece of world oil demand, because growth in both manufacturing and vehicle ownership is the most important driver of oil demand in these countries. Especially this problem can be touched in India and China, the economic growth of which grows at annual rate minimum 8-10% for the last 10 years.<sup>3</sup> The reality of such phenomena can be represented on the chart below.

---

<sup>3</sup> Data was taken from World Bank (2014)

**Chart 1.3 Change in oil consumption during the last 10 years.**

*Source: British Petroleum (2014)*



On the chart are taken the biggest non-OPEC oil consumers in the world. It is obvious at a glance that oil consumption in developed countries is decreasing. In USA decline in oil demand amounts for -8,10% for the period 2004-2014. In Japan this decrease is even higher -18,40%, whereas India exhibited 50% growth in oil consumption and essentially China increased it by 64,04%. Thus the theory by Kutasovic (2012) holds true. Therefore, oil demand is another factor, which can influence the world oil market equilibrium and its prices.

What's about Russian Federation, the country increased its oil consumption by 19,5% from 2,7 millions of barrels per day in 2004 to 3,2 millions of barrels per day in 2014, what is normal, but not so huge percentage change in comparison with India and China. The other point is that Russia stays to be a large oil producer, exporter and continuously growing demander, which shows the good prerequisites for strong economic position, but as practice showed not always, what will be analyzed further.

### 1.3 Financial Markets Factors

Contemporary oil market is very volatile, non-transparent and hardly predictable. Financial market factors can be another reason for oil prices fluctuation and for forming the nature of oil market. These factors can be useful instruments for evaluating the current, former and future oil price movements and analyzing the types of oil price fluctuations, which can be attributable to changes on the world oil markets, world economy and also economy of a concrete country.

Before describing the relationships between crude oil and financial markets factors, the prices and names for different oil types must be indicated. As macroeconomic practice and research shows, there is no unified or average oil price on the world oil market and it didn't exist before. Instead of this the indicative prices are used in international oil trade, which vary due to extraction region and oil quality. As concrete example can serve West Texas Intermediate (WTI) for trading in USA, British crude oil price Brent for trading in Europe, Dubai Crude for trading in Asia and OPEC Reference Basket which is the unified averaged price for all crude oil types traded by OPEC countries.<sup>4</sup> Additionally, more than 40 types of indicative prices are tracked, which vastly differ at the same time, due to specific factors like quality, thickness and location. Azarova (2012, p.37) narrates, that crude Russian oil type "Urals" is one of those indicative prices, which are determined and periodically published by independent observers. But she also notices, that Russian crude oil, which is transferred to export markets is not the crude oil, which was produced and transported fully in Russia. It means that crude oil traded on the markets is presented as mix of different crude oil types extracted in one place, and then collected and transferred to other place for further trade. Such type of mix crude trading oil is exactly "Urals" and also "Arab Light".

The oil price dynamics is determined by basic fundamental factors such as supply of oil and oil demand, but also by financial factors, which do have significant effect upon oil price fluctuation. According to Bushuev et al (2013, p.13), the crude oil market had the first precognition to become financial since 1986, when the oil productive countries were looking for the possibilities to exit from energetic crisis of 1970's. After 1986 the first establishment of exchange oil prices on financial markets had occurred and futures-commodity market started to develop. Then it is obvious at a glance, that crude oil started to be a financial security, which was the great goldmine for further speculations. Due to this fact, the oil prices can be influenced by financial activities, which is the

---

<sup>4</sup> Data was taken from British Petroleum (2015)

third decisive factor having effect on oil prices, besides supply and demand. The next section will look at relationships between oil market and different types of financial markets more clearly.

### **1.3.1 Oil Prices and Futures Market**

In 20<sup>th</sup> century, the oil market relationships developed on contractual basis with final result in terms of physical shipping of crude oil. But over time the trading model experienced some changes. Long-term contracts were supplemented by short-term contracts and later one-time transactions were used with immediate delivery of real oil product (spots) and afterwards with deferred delivery, supplied with product reserves and consequently without them (forwards). All this became the precondition for development of oil futures market and oil options. Therefore, the oil market ceased to be only real-delivery market and oil trading was gradually moving to the side of exchange financial markets.

Nowadays, oil futures are the integral component in oil trading and play a huge role in oil price-setting mechanism and are of macroeconomic importance on the world oil market. Futures contract is the standard binding contract of buying and selling the oil (or some different base asset), where the buyer and seller negotiate only about the price and term of delivery. The quality parameters and quantity delivered are negotiated beforehand. Lombardy and Van Robays (2011, p.10) state that futures markets can have two types effects on financial activity: stabilizing and destabilizing. The first one relates to the case, when agents intervening in the oil futures market bring their information sets and expectations about future fundamentals into pricing mechanism, thereby contributing to price-discovery mechanism, which additionally makes the markets more liquid. The second one appears if some agents bring disregarding expectations on fundamentals and irrational actions. As a result the oil-price mechanism can be distorted. Moreover, the futures markets exist and serve as an instrument of transferring the risks of oil price fluctuations. Therefore, two types of futures market agents exist: commercials or hedgers, which want to hedge against oil price fluctuations, by fixing in advance the price, which they will have to pay or receive for a delivery in the future and non-commercials or speculators, who intervene the oil futures markets and make profits in presence of oil price fluctuations (Lombardy and Van Robays 2011, p.10). Speculators make their profits in accordance with their expectations on the future oil supply-demand balance, but the futures prices de facto don't reflect always efficient pricing of the expected oil supply-demand balance. As result of ineffective investing strategy, the oil futures prices can be distorted, leading to their deviation and

further destabilization of financial market activities. Conversely, hedgers rely their expectations on oil market fundamentals, which don't distort oil prices mechanism and even enhances the oil price formation mechanism (Bushuev et al 2013, p.15). It means that futures markets activities can also have affect on oil prices and can lead to so called "speculation oil price shock", besides the main foregoing two factors: oil supply and oil demand (Kilian 2014, p.8).

## **1.4 Oil Inventories and Oil Prices**

Oil inventory is the fourth additional factor, which can have impact on oil price formation. More general and formal it can be represented as Petroleum Reserves (PR), which can be privately or governmentally held against some unexpected negative consequences as energetic crisis and oil price shocks. The petroleum reserves can be both commercial (used for production and transportation) and strategic (used in case of shortages). Such kind of oil reserves does exist almost in every country, which is involved in international trade no matter in export or import. Tailor and Van Doren (2005) suggest that such type of reserves can help a country to stay balanced in the presence of oil shortage and also help to hedge against risks like oil shocks and high oil prices. Moreover some exporting countries can even hold their oil inventories in different oil importing countries, due to commercial storage agreements to increase their flexibility in production quotas. For example, Russia has accumulated in their oil reserves more than 15 millions of tonnes in 2014.<sup>5</sup> It goes without saying that such reserves system can have some influences on oil prices and can help the country strategically insure against oil price shocks. The typical example can be creating of petroleum reserves in 1973 and firstly using them in 1990 by USA (Dashevskaya and Babalov 2012, p.46).

## **2. General Determination of Oil Shocks and its Economic Effects**

Slowly approaching to the main hypothesis of this bachelor thesis linked with Russian economy and world oil market relationship, it is required to look at additional economic phenomena called oil shocks. In the background of oil shocks it is relevant to distinguish "side" nature of oil shocks and

---

<sup>5</sup> Data was taken from Reuters Financial Agency (2014)

“price” nature of oil shocks. Cantore et al (2012), Dabrowski (2015), El Anshasy (2009), Buetzer et al (2012), Shafi and Hua (2014) and others positioned exactly oil “price” shocks, the background of which will be used in the paper further. They specified them as substantial, unanticipated and abrupt oil prices decrease or increase, which depends on the character of these shocks: positive, when prices are increased and negative, when prices are decreased. Basically such character stipulated by a side and prerequisite, which made oil price shocks to occur. Therefore Hamilton (2000) emphasized that oil market vastly fluctuates and this fluctuation in the common macroeconomic framework is caused by oil supply and oil demand movements, which do not stay at one place in view of the world oil market. Taking this fact from him into account, it needs to specify that oil shocks can be also supply-side or demand-side from the point of oil market equilibrium. Positive supply-side oil shock is defined by oil-supply movement to the side of increase, what leads to oil prices diminishing (negative oil price shock) and increase of production oil output. Negative supply-side oil shock is determined reversely, what entails oil prices to increase (positive oil price shock) and production oil output to decrease. The same can be interpreted with demand-side oil shock, the positive manner of which leads to increase of oil prices (positive oil price shock), whereas negative to decrease (negative oil price shock). It goes without saying that every type of shock leads to different consequences for economies of oil-exporting and oil-importing countries. Besides the oil shocks, described above, there are some factors and channels, through which these shocks can influence economies of different countries, which will be explained in next sections. But before it is better to look at the outward factors, which can call the oil shocks.

Looking more spacious Dashevskaya and Babalov (2012, p.44) described the groups of outward international factors, which can lead to oil shocks and energetic crisis of various types:

- 1) Natural or technogenic factors, caused by natural and geographic conditions (reserves and resources distribution), natural disasters, technogenic catastrophes, demographic changes.
- 2) Geopolitical factors, influenced by armed conflicts, oil-exporting and oil-importing countries' policy, multinational corporations and organizations.
- 3) Economic factors, such as oil prices relationships with U.S dollar, speculative capital growth and accent based on profit maximization, instead of searching new extraction locations and production innovations.

## 2.1 Short Historical Review of Oil Shocks Factors

Summarizing all the foregoing factors affecting oil shocks to occur, Dashevskaya and Babalov (2012, p.45) classified them into relevant groups, in accordance with type, described in short historical review since 1973.

**Table 2.1 Short historic factors review, influenced oil shocks.**

*Source: Dashevskaya and Babalov (2012, p.45)*

| Period    | Natural and Technogenic                                                                                       | Geopolitical                                                                                                                                                                     | Economic                                                                                                       |
|-----------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| 1973-1975 | 1) Substantial discovery of crude oil reserves on Spratly Islands. 2) Exploitation of oil reserves in Alaska. | 1) Syria and Egypt attacked Israel 2) Development programs of alternative fuel substitutes. 3) USA creates Petroleum Reserves. 4) OPEC become influential world energetic leader | First oil embargo, where OPEC prohibited oil export to countries (USA, Portugal etc.), which supported Israel. |
| 1979      | 1) Islamic Revolution in Iran. 2) Fighting for Persian Gulf.                                                  |                                                                                                                                                                                  | Weapon trade growth in Arabian countries.                                                                      |
| 1980      |                                                                                                               | Iran-Iraq War                                                                                                                                                                    | Economic crisis in oil-exporting countries.                                                                    |
| 1985      |                                                                                                               | Official national relationship renewal between USA and Iraq                                                                                                                      |                                                                                                                |
| 1986-1988 |                                                                                                               | “Tanker” Iran-Iraq War                                                                                                                                                           |                                                                                                                |
| 1990-1991 | 1) Oil emission in Persian Gulf. 2) Oil infrastructure destruction of Iran and Kuwait                         | 1) Iraq invaded in Kuwait 2) United Nations imposed sanctions against Iraq. 3) The Dissolution of Soviet Union                                                                   | First time were used strategic oil reserves in USA                                                             |

|                        |                                                                                |                     |                                                                                                 |
|------------------------|--------------------------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------------|
| 1994                   |                                                                                | Russian-Chechen war | The beginning of oil era in Russia                                                              |
| 1999-2000              |                                                                                |                     | 1) OPEC shortened oil production quotas (besides Iraq). 2) World Financial Crisis               |
| 2003                   |                                                                                | USA-Iraq war        | 1) OPEC increased oil production quotas. 2) Partial embargo on Iraqi oil                        |
| 2008-2012              | 1) Deepwater Horizon explosion in Mexican Gulf. 2) Shale Oil Revolution in USA |                     | 1) World Financial Crisis. 2) U.S Dollar depreciation. 3) Sufficient investments in oil futures |
| 2014-2015 <sup>6</sup> | Increasing production of shale oil in USA                                      |                     | OPEC did not cut oil production quotas                                                          |

## 2.2 Oil Price Shocks and their Effect on Economic Growth

Oil price shocks can be a serious reason for some countries to develop and recess. Attitudes of authors differ and are usually splitted into two groups. Some of them do not pay much attention to the fact, that oil price shocks can truly matter and do not believe that oil prices can seriously affect some countries, but others consider this fact very crucial in understanding the overall oil price shocks effect on macroeconomic components and macroeconomic activity. So far the main features have been discussed, linked with oil price formation, basic factors, which influence oil prices volatility and the nature of oil price shocks, which can be either influenced by some more deep and outward factors worldwide. This section and its subsections analyze the influential factors and transmission mechanisms channels, through which already oil price shocks can affect different types

---

<sup>6</sup> Added by the author. Data was taken from Reuters Financial Agency (2015)

of economy.

First of all, if it is crucial to analyze the oil price shocks economic effects on different countries, it is desirable to understand, that such countries in “oil-perspective” should be segregated into net oil-importers and net oil-exporters. Cantore et al (2012, p.1) taking the observation of many developing and developed countries, involved in international oil trade concludes that positive oil price shock has negative effect on real GDP of oil-importing countries, because of higher production costs, which makes the inputs costs for firms higher and then unemployment higher. From the different point of observation, the authors specified that positive oil price shock tends to be positively linked with oil-exporting countries’ real GDP and employment rates. This can be interpreted in terms of revenue, which a country receives from oil exports and also in terms of efficacy of fiscal policy of oil-exporting country. It is obvious at a glance, that these aspects in importing (production inputs) and exporting (revenue) economies cannot be a sole statement, how oil price shocks change macroeconomic activity. Anyway, the transmission mechanisms, through which the different types of oil price shocks can have economic effect, are various. It means that the ways, how negative or positive oil price shocks affect economy are different for oil-importing and oil-exporting countries.

In the next two sub-sections the analysis will be concluded with aim to identify, how oil price shocks whether negative or positive can change the macroeconomic activity of oil exporters and importers. The case of exporting countries will be provided as the main hypothesis of this paper is to analyze the relationship between oil price changes and real GDP in Russia, which is one of the biggest oil-exporting countr.

### **2.3 Oil Price Shocks and Oil-Importing Countries**

Oil price shocks tend to have significant effects on the macroeconomic variables of net oil-importing developing countries, including economic growth, employment, balance of payments and government accounts. However, the mechanisms of transmission differ from those in net oil-exporting countries. The empirical study of these mechanisms also points to the relevance of distinguishing between short- and long-term effects (Cantore et al 2012, p. 10). Moreover the authors of the paper emphasized the fact, that GDP growth in most oil-importing developing countries during the world economic crisis in 2008 slowed down because of positive oil price shock

and stabilized only after oil prices began to fall in 2009. From this example, can be made the reasonable statement, that oil price shocks effect is asymmetric towards economic activities of oil-importing countries, which implies the reduction of GDP during higher oil prices and positive growth in case of lower the prices.

Tang, W., et al (2010, p. 3) have described the way, through which transmission channels the oil price shocks performance can affect the macroeconomic variables of oil-importing developing countries, based on the example of China. The authors also claimed that some of these transmission mechanisms can be identical in influencing the economic activity in developed countries like USA, during occurrence of oil price shocks. According to Tang, W., et al (2010, p. 3), there are six theoretically described transmission channels of oil price shocks affecting macroeconomic variables:

- 1) Supply-side shock effect: focusing on the direct impact on output due to the change in marginal producing costs caused by oil-price shock. In case of positive oil price shock, in short time it decreases the output because of more costly production costs (as oil is viewed as production input) and due to capacity utilization, which then entails decrease in income and higher unemployment in the long-term. Additionally to the effects on supply, higher oil prices entail demand-side effects on consumption and investment, making them fall in oil-importing countries. Moreover, oil-price shocks also have long-term effect on output, which is carried out through Price/Monetary Transmission Mechanism.
- 2) Wealth transfer affect: describes the situation in case of performed oil price shock, where the income of oil-importing country is redistributing to oil-exporting country, what overall entails higher consumer demand in oil-exporting country and lower in oil-importing.
- 3) Inflation effect: analyzing relationship between domestic inflation and oil prices. In case of positive oil price shocks, the level of prices is increased due to higher production costs (and transportation is more expensive), what also makes the firms to get less revenue. The comment about foregoing statements can be also added by Jiménez-Rodríguez and Sanchez (2003, p.3) who specified that at higher oil prices, the demand for capital (in the absence of a strong substitution effect in production) will drop, thereby inducing a downward adjustment in investment activity. Costs shocks can be transmitted from industries and producers to end-users as the result of inflation effect, where it results in the long-term in output and decrease both in income and demand for money.
- 4) Real Balance Effect: exhibits the change in money demand and monetary policy. In case of

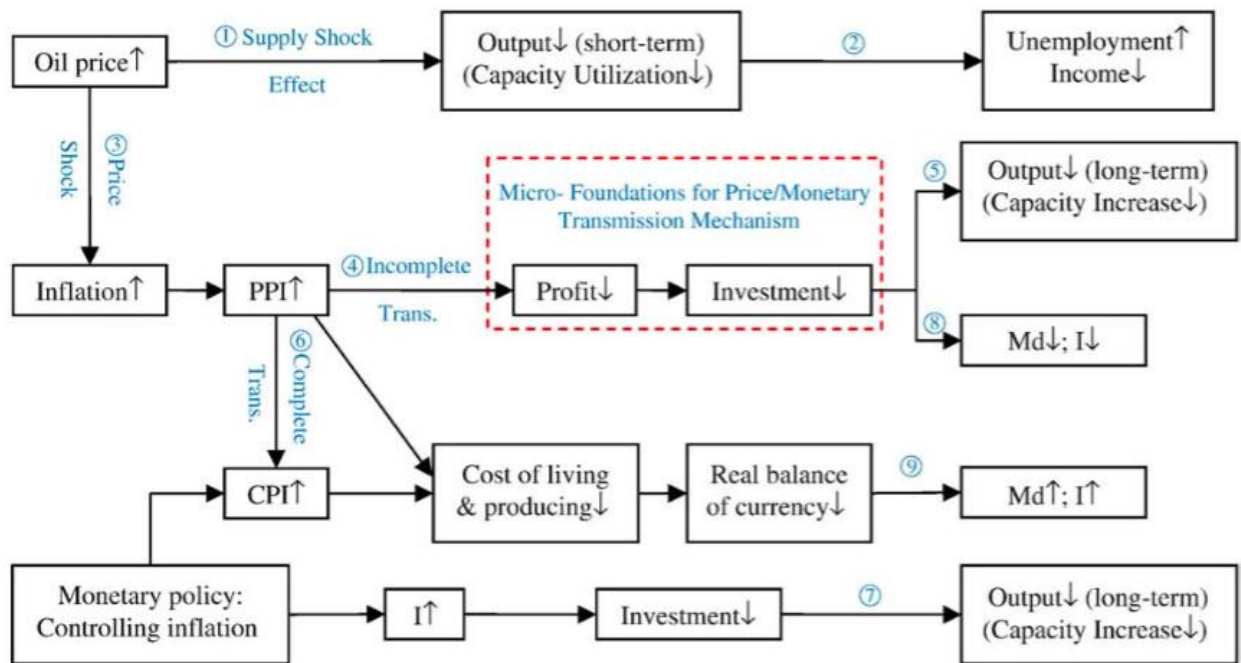
increased oil prices, this effect attributed to the foregoing conclusion, where demand for money decreased. For instance it may happened that people did not prefer to save but borrow, which can entail the interest rate to rise and demand for money to diminish. Also real balance effect can be observed in case, where monetary policy makes remedies in the situation during positive oil price shock performance by controlling inflation. It is explained as central banks adopt a tighter monetary policy, thereby contributing slowdown in economic activity.

- 5) Sector Adjustment Effect: estimating the adjustment cost of industrial structure, which is mainly used to explain the asymmetry in oil-price shock impact. During the positive oil price shocks, the production costs adjustments for changes can be another cause of decreasing macroeconomic activity. Increase in oil prices would lead to an expansion of energy-efficient sectors relative to energy-intensive sectors. Positive oil price shocks that imply readjustment between energy-efficient and energy-intensive sectors will lead to some loss in output. Generally this effect can be also called as sectoral reallocation of resources. (Bobylev 2006, p. 21)
- 6) Unexpected or Uncertainty Effect: focusing on the uncertainty over oil price and its impact. This effect happens when firms and consumers do not know, what kind of oil price shock to expect. It makes them uncertain about future investments and as a result decrease

These transmission channels, provided by Tang, W., et al (2010) are crucial for macroeconomic behavior of oil-importing developing countries during the occurrence of oil price shocks. Finally it can be concluded, that mostly positive oil price shocks can negatively respond to macroeconomic activity in oil importing countries. For better illustration chart below summarizes afore-mentioned statements.

**Chart 2.2 Transmission channels of oil price shocks for oil-importing countries.**

Source: Tang, W., et al (2010, p.3)



## 2.4 Oil Price Shocks and Oil-Exporting Countries

As already mentioned before, oil price fluctuations have considerable macroeconomic consequences. These consequences on real activity are expected to be different in oil importing and in oil exporting countries. Oil price increase should be considered good news in oil exporting countries and bad news in oil importing countries. The reverse should be expected when oil price decreases (Jiménez-Rodríguez and Sanchez 2003, p.2). The same statements for oil-exporting countries were analyzed and concluded by Ito (2008), Rautava (2013) and Melnikov (2010) regarding Russian Federation, by Berument et al (2011) about countries in the Middle East, by Farzanegan and Markwardt (2009) about Iran, by Umar and Abdulhakeem (2010) regarding the economy of Nigeria. It goes without saying that such sophisticated phenomena as oil price shock may have different consequences for each of oil-exporting country. This assertion is designed from the country's dependence on oil, in other words to what extent a country is dependent on oil export

and what oil contribution to the economy it has. Dabrowski (2015)<sup>7</sup> has segregated the oil-exporting countries into 5 groups according to the dependence of their economies on oil, taking into account the number of oil exports as a percentage rate from the whole trading exports amount and oil rents as a percent of GDP for the year 2013: ‘Monoculture’ exporters, whose amounts of oil exports exceed 90% of total exports (Algeria, Azerbaijan, Iraq, Kuwait, Libya, Sudan, Venezuela), very high dependent exporters, whose oil exports stay between 80% and 90% of total exports (Nigeria, Oman, Qatar and Saudi Arabia), high dependent exporters, which have oil exports 60-80% of total exports (Bahrain, Columbia, Iran, Kazakhstan, Norway, Russia and UAE), oil exporters with moderate dependence between 40% and 60% of total exports (Bolivia) and lastly limited dependence oil exporters with less than 40% of total exports (Canada, Indonesia and Malaysia). The main idea here is coherent with different macroeconomic behavior of these countries, which may suffer during the negative oil price shocks, but to a different extent. Therefore Dabrowski (2015) in his article specified that this extent depends on how the countries’ economies diversified the nature of fiscal and monetary policy applied to support sustained positive economic growth and to mitigate negative consequences. For example, more diversified economies (Canada, Indonesia and Malaysia) have been less affected by the negative oil-price shock in 2014-2015 than those that are highly dependent on hydrocarbon production and exports (Dabrowski 2015). What’s about countries that are highly dependent on oil production and exports, those responded with large-scale fiscal stimulus (Gulf countries, Algeria) and have managed to mitigate the impact of lower oil prices on GDP. However, they have had to pay a price in terms of deterioration of their fiscal positions and current-account balances. The sustainability of such a policy response in the longer term will depend on the future level of oil prices, the size of fiscal buffers and central banks’ international reserves, and the elasticity of the supply sides of individual economies (Dabrowski 2015). It means that for every oil-exporting country does exist the negative impact from negative oil price shocks, but it solely depends on the macroeconomic regulators (monetary and fiscal policy), type of exchange rate policy and other different factors, which help a country to recess less or make to recess more. This section is not going to provide with whole description and economic consequences from negative oil price shocks for every oil-exporting country (additionally it will be rather observed on the case of Russian Federation in next sections), but to provide the main overall factors and transmission channels, through which oil price shocks affect the economies of oil exporting countries in common frame.

As was said before, the oil price shocks have significant impact on oil-exporting countries, given

---

<sup>7</sup> The article was taken from Bruegel Research Agency (2015)

their dependence on oil and presense transmission mechanisms are different than in oil-importing countries. Cantore et al (2012, p.8) emphasized that empirical studies of the causal relationship mechanisms between oil prices and macroeconomic variables show that real GDP and unemployment rates tend to be linked to changes in oil prices, with the increase in oil prices associated with a positive impact on the country's economy and controversially. Taking the common set of transmission mechanisms affecting economy of an oil-exporting country by oil-price shocks, Dabrowski (2015), El Anshasy (2009a), El Anshasy (2009b), Ghalayini (2011), El Anshasy and Bradley (2011), Shafi und Hua (2014), Jiménez-Rodríguez and Sanchez (2003), Aziz (2003), Buetzer et al. (2012) and Bushuev et al. (2013) have positioned the most important overall ones: fiscal policy, consumption, investments, exchange rates and monetary policy.

#### **2.4.1 Oil Price Shocks and Fiscal Policy**

One of the main transmission mechanisms, through which international oil price changes affect net oil-exporting countries economies are impacts on government revenue and expenditure. It happens because in majority of these countries' oil revenues contribute to the government. Logically it means that during the negative oil price shocks, an oil-exporting country can exhibit the lack of revenue, received from the export of oil, which is the part of GDP, which entails the negative consequences and vice versa in case of positive oil price shock. Sequentially it shows that an oil-exporting country should have competent governmental management, to mitigate the negative consequences of negative oil price shocks and properly reallocate the cumulated revenue, occurred during positive oil price shock. That's why some exporting countries can exhibit weaker negative performance for GDP during negative oil price shocks and even better GDP performance during positive oil price shocks. The nature of shocks is unanticipated and hardly predictable, which creates the uncertainty about governmental revenues. El Anshasy (2009a, p.1) added that for oil-exporting countries oil price shocks are mainly a fiscal phenomenon because of their direct impact on government finances, resulting in a highly volatile revenue stream and often, pro-cyclical government expenditures, as well as pro-cyclical foreign and domestic finance. This gives the main answer that oil prices shocks are transmitted to the economy mainly through fiscal policy. The mechanisms, through which fiscal policy interacts with oil price shocks affecting long-run economic growth were described by El Anshasy (2009a, p.2) as follows: the composition of public expenditures, the method of financing these expenditures and the response of fiscal policy to oil price shocks. In accordance with previous

utterances, both negative and positive oil price shocks can be involved into economy through large fluctuations of government revenues, which creates uncertainty about future level of these revenues and can result in changes in government spending due to reassessing the revenue from oil exports, generating significant adjustment costs. Cantore et al (2012, p.9) analyzing the economic performance of the largest oil producers including Russia have found out that government budgets improvement and worsening during exhibition of oil price shocks may not only be explained by different degrees of oil dependency, but also by differences in expenditure patterns, which are the percentage of non-oil GDP of oil exporting countries. Collecting the information and empirical results, they also confirmed this fact by researching economic activities during higher oil prices in the period 2004-2008 and oil price shock decline in 2009. Thus, it was mentioned that both low-income oil exporting countries such as Nigeria and more developed such as Russia and Saudi Arabia were increasing government expenditures during positive oil price shocks and decreasing during negative oil price shocks. The statements above indicate the pro-cyclical character of fiscal policy, by transmitting oil price shocks into economy. Therefore, such pro-cyclicality could be a negative scenario for an oil-producing economy during negative oil price shocks exhibition. El Anshasy and Bradley (2011, p.606) have also accentuated that during the latest oil boom (2004–2008) the biggest oil-producing countries increased public spending, which gives evidence about the pro-cyclicality of government expenditures relative to GDP in oil producing countries. Moreover, they stated, that one major reason is that, in many oil-producing countries, fiscal policy is guided by the public policy objective of creating more public sector employment and increasing the citizen's incomes as a means of sharing the oil revenue. Furthermore, by analyzing 15 biggest oil-exporting countries, El Anshasy (2009b, p.12) concluded that: "Unanticipated changes in oil prices have a direct income effect on the growth in government spending. When oil prices increase, government revenues also increase and government spending rises. In addition, higher oil prices stimulate private sector consumption and lead to higher private sector growth. This also causes faster growth in government spending. On the other hand, declining oil prices have a contractionary impact on government spending." The theoretical model thus predicts that there should be a positive coefficient on oil price changes in the government spending growth equation.

The same findings have been obtained by Anshasy (2009a, p.2) about oil price shocks' impact on real GDP of 15 biggest oil-exporting countries worldwide. She lastly analyzed and came to conclusion that unanticipated increases in oil prices trigger higher economic growth rate in long run. As a result fiscal policy does play an important role in transmitting oil price shocks to economy.

Additionally, oil revenue booms are retarded to long run perspective and countries that have a higher initial share of public investment to GDP can better cope with adverse oil shocks and channeling some of the booming revenues to increase spending on infrastructure and public services tend to stimulate growth. Moreover, Anshasy (2009b, p.16) suggested the methods and remedies, how an oil exporting country can better act during oil price shocks, mitigating the consequences of revenue uncertainty and even provide higher growth performance during positive shocks and avoid more detrimental consequences during negative ones. Recommendations are as follows:

- (i) Diversification policies and expanding the non-oil tax base are growth-improving
- (ii) At times of scarcity, governments should avoid cutting capital expenditure and should increase social spending to help stimulate growth and
- (iii) At times of plenty, the government should apply more prudent investment policies and stricter public projects criteria in order to enhance the productivity of the (larger) expenditures especially on infrastructure and on improving public services.

Now it is clear that fiscal policy is one of the most important transmission mechanisms, through which oil price shocks affect the economy in the long run, but it should be effective. Foregoing statements made by experts showed that positive oil price shocks are a good remedies for oil-exporting economy to develop, which induces higher GDP growth, investments, consumption, income and government spending, whereas negative oil price shocks' impact is reverse to the previous one. Regarding investments, increased oil prices can be good news for accumulating the revenue for funding the government budget and as result the investments opportunities could be more enhanced through higher social (government) spending, what can lead to formation of new projects and creating of new labor vacations, which is also good for employment. The reverse effect can be observed by negative oil price shocks scenario, government formed projects can be left unfinished, due to unexpected budget deficit and consequently government spending is cut (Bushuev et al. 2013, p.49). Jiménez-Rodríguez and Sanchez (2003, p.2) interpreted consumption and investments as affected “demand-side” of economy. They emphasized that higher oil prices entail demand-side effects on consumption and investment. Consumption and investments will increase in an oil exporting country when oil prices rise, and in an oil importing country when oil prices decline. All this of course can be explained with help of pro-cyclical expenditure program by a government of oil exporting country in terms of income effect during oil price shocks. As

investments increase it is good news for higher employment and economic growth in a country (Shafi and Hua 2014, p.171). Moreover Ghalayini (2011, p.128) has made also another theoretical assumption regarding consumption and inferred that consumption is affected indirectly through its positive relation with disposable income. Also he stated that the magnitude of this effect is in turn stronger the more the shock is perceived to be long-lasting. For net oil-exporting countries, rise of oil price directly increases real national income through higher export earnings. But the part of this gain would be later offset by losses from lower demand for exports, generally due to the economic recession suffered by trading partners.

## **2.4.2 Oil Price Shocks and Exchange rates**

Another transmission mechanism of converting oil price shocks to economy of oil exporting countries is real exchange rate. According to Shafi and Hua (2014, p.170), real exchange rate could be a good predictor for economic growth in oil-exporting countries and may be tightly linked with oil price shocks. Moreover Shafi and Hua (2014, p.170) investigated the relationship between oil prices volatility and economic growth and noted that increase in oil prices is regarded as a positive signal for the oil exporting countries and positive translation in real exchange rate. Aziz (2003, p.3) theoretically assumed that it is well established that an oil exporting country may experience real exchange rate appreciation (fall in exchange rate) when oil prices rise and depreciation (increase in exchange rate) when they fall. To look at this assumption more precisely, the real exchange rate is viewed as purchasing power of two international currencies at prices at current exchange rate and goods' prices. From a theoretical point of view an oil price shock may be transmitted to the real exchange rate through different channels: the terms of trade, wealth effects and the associated trade balance and portfolio reallocation (Buetzer et al 2012, p.6). It was also mentioned that the impact of oil price shocks to exchange rates is mainly transmitted by changes in the terms of trade. This channel of transmission is not only functioning in oil exporting economies where movements in oil prices, by definition, dominate the terms of trade, but also in major industrialized economies (Buetzer et al 2012, p.6). According to foregoing authors, the price of the traded goods is fixed on international markets, which determines domestic wages for both the traded and non-traded good sectors. Assuming internal labor mobility across the two sectors, a positive terms of trade shock drives up the price of the non-traded good in the domestic economy and the real exchange rate, which is defined as the relative price of a basket of traded and non-traded goods between the

domestic and the foreign economy. Aziz (2003, p.7) also explained this transmission effect in terms of trade by mentioning that each sector uses both a tradable input (oil) and non-tradable one (labor) and besides constant returns to scale technology, which assumes that inputs are mobile between sectors and that sectors do not make economic profit. The output price of tradable sector is internationally fixed; hence the real exchange rate corresponds to the output price in the non-tradable sector. Aziz (2003, p.7) at last theoretically inferred that a rise in oil price leads to decrease in labor price so as to meet competitiveness requirement of the tradable sector and if the non-tradable sector is more energy intensive, its output price rises and real exchange rate appreciates. The opposite can be showed if the non-tradable sector is less energy intensive than the tradable one. Therefore in case of oil-exporting countries, positive oil price shock may be an instrument for appreciation of the real exchange rate as prices of non-tradable goods go up relative to tradable goods. Another important channel of transmission oil price shocks to exchange rates is through "wealth effects" and the way this is spent or reinvested by the oil exporting countries. The channel can be explained by the fact where a rise in oil prices is associated with wealth transfers from oil importers to the oil exporting economy, leading to current account imbalances (Buetzer et al 2012, p.6). Thus it is crucial understand that exchange rate can be another transmission mechanism, through which oil price shocks can influence economic growth of oil-exporting countries. To support above mentioned discussion, Shafi and Hua (2014, p.176) have made econometric analysis from 1971 to 2012 regarding economy of Russian Federation and concluded, that there is positive relationships between oil price shocks and real exchange rate have positive.

Continuing the topic of economic transmission mechanisms' affection by oil price shocks, it is necessary to specify that nominal exchange rate can be also important intermediate factor. Bushuev (2013, p.16) specified that currency of oil-exporting countries may appreciate during positive oil price shocks and depreciate during negative. This is determined by the dependency of a country on oil-export, in other words to what sufficient extent the oil revenues are contributed to GDP. Therefore higher accrue of oil revenues theoretically can be a good sign for a stronger currency of a sufficient oil-exporting country and vice versa. The second factor could be the dependence of U.S dollar and oil prices. Fratzsher et al. (2004, p.24) by making econometric analysis of oil prices and U.S dollar have found out that increase in the price of oil leads to a depreciation of the U.S dollar exchange rate and vice versa. During the low oil prices, the strong U.S dollar can be bad news for the currencies of different oil-exporting countries. Taking into account illustrative example of nominal exchange rate between ruble and U.S dollar, Bushuev et al. (2013, p.17) confirmed that the

appreciation of dollar could be not a good scenario for ruble, since it involves ruble depreciation, especially during the period of negative oil price shocks. Such effect due to weakened national currency can lead to higher level of inflation and consequently central bank has to intervene. It can apply the inflation targeting and let the nominal exchange rate float towards the movement of world economy and increase the real interest rate by decreasing the money supply. However such an increase can have negative consequences for production on account of higher cost for money and more expensive loans. The other option is to target fixed exchange rate, but it can lead to inevitable capital movement restriction and external trade reduction. Therefore the central bank could be an instrument for transmitting the oil price shocks to economy of an oil exporting country by making intervention decisions, which could be simultaneously useful, but at the expense of some negative consequences. As a result, it happens due to the nominal exchange rate, which as was stated above is another intermediate transmission mechanism, through which oil price shocks can affect the economy of oil exporting countries, by affecting the decisions of monetary policy.

### **3. Economic Review of Russian Economy**

As it has been seen so far, oil itself a very sophisticated macroeconomic component worldwide. Up until that time, the main features linked with oil were discussed and stated. There were mentioned the factors, which influence oil price formation and changes in common frame. Moreover the conceptual, historical and natural determination of oil price shocks was discussed, taking into account the theoretical impact of these shocks on oil-importing and oil-exporting countries, where it was clear to understand that for every country oil price shocks' effects are different. The main hypothesis outlined is aimed to verify, whether oil price changes may have influence upon economic growth of Russian Federation, which was chosen as the main case for analytical part. Firstly it is important to look at Russian macroeconomic trading policy towards crude oil to see that Russia is significant oil exporter. Later, the hypothesis will be verified on case of Russian economy, by using appropriate econometric model.

Russian Federation is one of the largest oil producers. In 2014 as was mentioned before, its world share in oil supply achieved 12,6 % with 10,8 millions of barrels a day produced<sup>8</sup>. The total prove

---

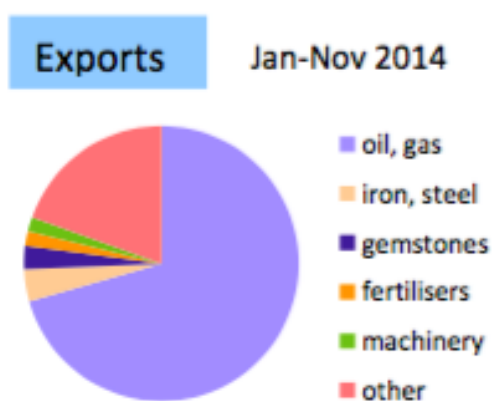
<sup>8</sup> Data was taken from British Petroleum (2014)

reserves for the same year amounted for 6,1%, which numerically were 103,2 thousand millions of barrels<sup>9</sup>. It goes without saying that such amounts can say that Russia plays sufficient role on the world oil market, especially in oil exports.

Russell (2015, p.3) has indicated, that Russian economy is quite dependent on oil revenues from exports and in accordance with this statement he collected the data and expressed it on the chart for the year 2014 as a concrete example.

### Chart 3.1 Total Russian Exports by Share

Source: Russell (2014, p.3)



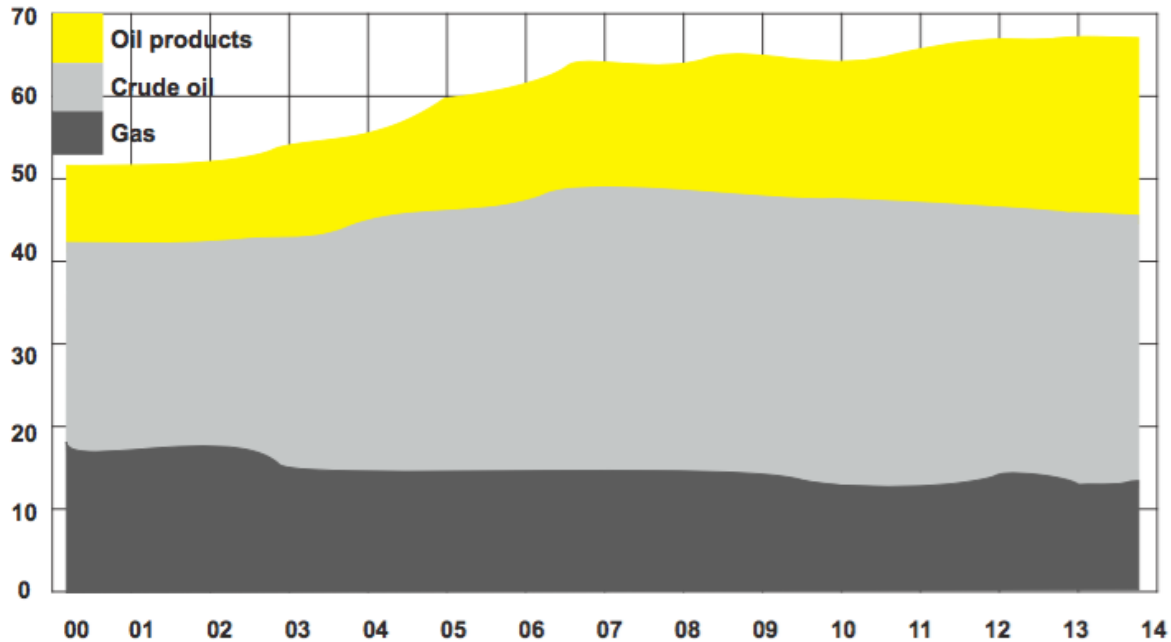
According to the chart, the export share by oil and gas does present more than 70% of total exports in 2014, which is much higher than exports from other industries. For positioning oil and gas, it is possible to look on the chart below by Hellevig (2014, p.12).

---

<sup>9</sup> Data was taken from British Petroleum (2014)

**Chart 3.2 Export Share of Russian Energy in %, 2000-2014**

*Source: Hellevig (2014, p.12)*



Here it is obvious at a glance that crude oil export share is the most biggest in comparison with oil products and gas. Crude oil exports by energy sector amounts for more than 23% in 2000 and increased to more than 30% in 2014. It means that Russian Federation annually receives sufficient revenues from oil exports, which is in line with the previous.

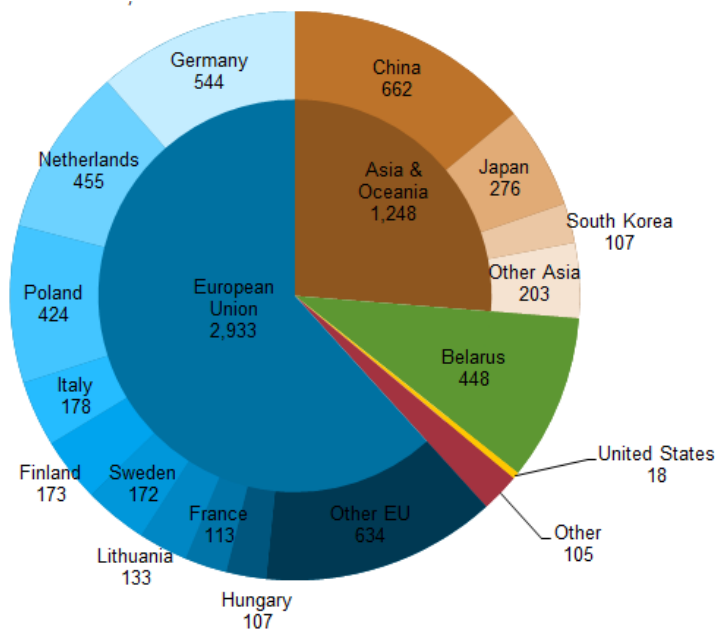
In 2014, Russia had 7,3 millions of barrels per day provided for exports. The number is large, because for example for the year 2013, Russian federal budget accumulated 54% of total export revenues, received from crude oil and its products<sup>10</sup>. The majority of crude oil exports (72%) in 2014 went to European countries, especially to Germany, Netherlands, Belarus and Poland<sup>11</sup>. It significantly shows that Russia is dependent on European demand and consequently Europe needs Russian oil supply. Another part of oil exports go to U.S and Asian countries. Short overview of the set of countries-demanders may be observed below.

<sup>10</sup> Data was taken from U.S Energy Information Administration (2013)

<sup>11</sup> Data was taken from U.S Energy Information Administration (2014)

**Chart 3.3 Russian Crude Oil Exports by a Country**

*Source: U.S Energy Information Administration (2014)*



Taking the fact that crude oil exports are the major part of Russian trading policy, it is important to emphasize that the revenues from oil exports make sufficient contribution to Russian GDP. For instance in 2013 Russia was able to get 33,3% of crude oil revenue from the total exports, which amounted 174 billions of U.S dollars (8,5 % of real GDP with base year 2008)<sup>12</sup>. Additionally, with oil products Russia accumulated 283 billions of U.S dollars, which amounted 14 % contribution to real GDP and 54,1 % of the whole export revenue.<sup>13</sup>

### 3.1. Oil Price Shocks and Russian Economy

The world exhibited many different events, which are responsible to some extent for the occurrence of oil price shocks. It is obvious that aforementioned discussed factors at particular extent influenced the world oil market and surely its prices. But in the frame of the last 15 years, oil prices experienced very high degree of volatility. In the period 2004(Q2) - 2008(Q2) oil Brent price was

<sup>12</sup> Data was taken from Central on Global Energy Policy (2014)

<sup>13</sup> Data was taken from Central on Global Energy Policy (2014)

increasing from 35,41\$ per barrel to 121,20\$ per barrel, what in percentage relation is 242,3%<sup>14</sup>. In the paper Brent trading mark is applied as analytical observation. This is due to the fact that more than more than 70% of exporting oil types are directly or indirectly based on Brent price and Russian oil type Urals is not exception here, as Urals historically was always indicated as Brent oil price per barrel discounted (i.e being decreased be less than 1\$), due to its heaviness and more sulfur contain. As written on official Urals website, it is impossible to find the appropriate statistics of Urals, that's why it was solved by the managing committee to indicate Brent oil price<sup>15</sup>. Going back to the statement of increasing oil price in stated period it is required to say that such a great amount of rising oil prices were firstly stipulated by gradual decrease of world oil supply and consistent growth of oil demand, especially by developing countries, which was already stated in previous sections by Kutasovic (2012), in other words by the growing world economies' factors. During this significant period of 4 years, Russia was able to increase its real GDP (base year 2008) in rubles by 34,3%<sup>16</sup>. Then the negative oil price shock occurred in 2008(Q3) and in 2009 (Q1) the level of oil price was already 44,52\$ per barrel<sup>17</sup>. During the period from 2008(Q1) up to 2009(Q1) real GDP of Russia (base year 2008) vastly decreased by 9,2%<sup>18</sup>. Such negative oil price shock at that time could be justified by economic factors as stated by Dashevskaya and Babalov (2012, p.45), which happened during the world economic crisis. At that time predominated global recession, but was improved oil refining productivity of oil production countries and increased oil supply growth by some non-OPEC countries. All this pressure on the world oil market was also accompanied by speculations on markets of oil futures.

This paper is supposed to contribute to the extensive research of the Russian oil market and also brings certain level of actuality. Section deals with the current abrupt fall in oil prices started in 2014 and continued in 2015. This contemporary negative oil price shock was caused by different events. In 2014 USA started to increase the production capacity of oil.<sup>19</sup> The phenomena called shale revolution, which happened in 2012 intensified such event. This year USA oil producers started to extract the new type of oil, called shale oil. Taking this fact into account, American oil production was increased by 45%, which is the great and successful indicator for the several

---

<sup>14</sup> Data was taken from Federal Reserve Bank of St. Louis (2015)

<sup>15</sup> Nefturals (2015)

<sup>16</sup> Data was taken from Russian Statistical Office (2015)

<sup>17</sup> Data was taken from Federal Reserve Bank of St. Louis (2015)

<sup>18</sup> Data was taken from Russian Statistical Office (2015)

<sup>19</sup> As was stated in the beginning of the paper, USA is one of the biggest non-OPEC oil producers, which can influence world oil prices.

decades<sup>20</sup>. Moreover simultaneously that year the countries such as Brazil and Kazakhstan also contributed to the larger amount of production. The third reason can be weak demand for oil due to lower world economic growth. But the prevailing factor is increased amount of shale oil. Americans invested billions of dollars into shale oil extraction. Thus in August 2014, from such a great pressure upon “oil-bubble” the negative oil price shock hit the economy, which distorted world oil prices. In the period from 2014 (Q3) up to 2014 (Q4) Brent oil price decreased from 101,90\$ per barrel to 76,43\$<sup>21</sup>. After such unanticipated and sharp negative oil price shock, the world government expected the OPEC-countries to decrease its production quotas to sustain oil prices to rise. As it was already mentioned, OPEC countries contribute almost to 40% of the world oil supply and can be the most serious remedy for affecting the world oil prices. Hopelessly, OPEC countries did not decrease the quotas, but left them at the same level. Such decision caused continuous decline in oil prices and in summer 2015 Brent oil price achieved the value of price less than 47\$<sup>22</sup>. There are some points of view why it happened. Some experts say that OPEC had fears from a new sufficient competitor, which can occupy new certain share of world market oil market. Such OPEC’s decision towards constant production quotas can eliminate some American extraction firms from the market, because the break-even point of producing a barrel in OPEC countries is about 10-15\$, whereas in America it is 60-70\$<sup>23</sup>. By stipulating and analyzing such contemporary oil price shock, it is important to say that it has pro-political and economic (OPEC decisions) and also technogenic (shale oil extraction) formulations. Such types of formulations were historically already touched and explained before in previous sections by Dashevskaya and Babalov (2012, p.45)

The explanation, which describes oil price shock is obvious now. What’s about the economic activity, Russian real GDP (base year 2008) in 2015(Q1) has been decreased by 2,3% in comparison with analogical quarterly period in the previous year<sup>24</sup>. It is not allowable to state now that this decline was called by foregoing negative oil price shock. The following econometric analysis will provide insight into possible affection of real GDP of Russia by oil price changes.

---

<sup>20</sup> Data was taken from Platts (2015)

<sup>21</sup> Data was taken from Federal Reserve Bank of St. Louis (2015)

<sup>22</sup> Data was taken from Reuters Financial Agency (2015)

<sup>23</sup> Data was taken from Platts (2015)

<sup>24</sup> Data was taken from Russian Statistical Office

## **4. Empirical Part**

### **4.1 Methodology**

The methodology of the empirical part is presented in this section. Firstly, the time series data were collected from three different sources (Russian Statistical Office, Federal Reserve Bank of St. Louis and OECD database). Secondly, the data were analyzed initially through descriptive statistics and charts. The third step is to deal with seasonality and stationarity of all variables, because otherwise the results could be biased. The main part of empirical analysis is regression analysis of time series from years 2003-2015. The regression analysis enables to investigate the impact of the price of oil on the performance of the economy of Russian Federation measured by real GDP. The econometric model is verified in terms of normality of residuals and statistical significance of results and also in terms of multicollinearity, heteroscedasticity and autocorrelation before the results are interpreted. For empirical part econometric software E-views is used.

#### **4.1.1 Hypothesis**

This thesis tends to analyse throughly the whole set of aspects linked with crude oil prices. Russian Federation was chosen as a representative economy, to understand and confirm hypothesis about the impact of oil prices on real GDP. Therefore it is important to hypothesize if the Russian Economy can be truly influenced by the oil prices and outward policies on the world market.

#### **4.1.2 Data**

This part is devoted to introduction of all variables obtained for analysis and their descriptive statistics. The data are quarterly and all variables indicated in monetary units were calculated by Russian Statistical Office using deflator of GDP with base year of 2008 into real variables and into U.S dollars. It was difficult to obtain all variables data for the period before 2003, thus the longest period for analysis is period from the first quarter 2003 to first quarter of 2015. All variables are graphically represented bellow. The real GDP of Russian Federation will be dependent variable and

it is indicated in billions of American dollars. The first explanatory variable The Brent Oil Price indicated in dollars. Second explanatory variable is the long-term real interest rate in percentages followed by real consumption expenditures, indicated in billions of U.S dollars. Unemployment rate, indices of industrial production and consumer prices are indicated in percentage. For all variables descriptive statistics table and graphic representation figure are presented bellow. From studying descriptive statistics there was not identified any possible outliers.

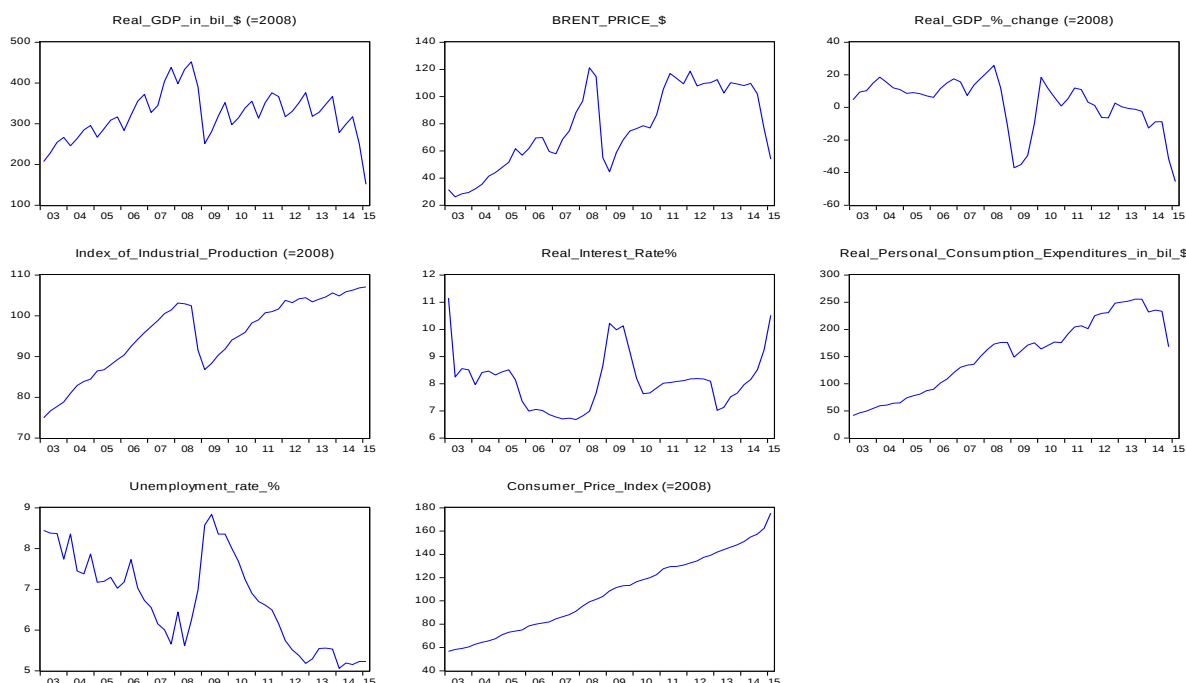
**Table 4.1 Descriptive Statistics of Variables**

*Source: Own computations*

| Variable                        | Mean     | Median   | Maximum  | Minimum   | Observations |
|---------------------------------|----------|----------|----------|-----------|--------------|
| <i>REAL_GDP_IN_BIL_DOLLARS</i>  | 320.3053 | 318.2249 | 451.8677 | 151.5508  | 49           |
| <i>REAL_GDP_PERC_CHNG</i>       | 2.449980 | 7.134471 | 25.78728 | -45.52043 | 49           |
| <i>REAL_INTEREST_RATE</i>       | 8.088163 | 8.090000 | 11.15000 | 6.680000  | 49           |
| <i>REAL_PERSONAL_CONSUMP</i>    | 153.6610 | 165.9388 | 255.5391 | 41.43183  | 48           |
| <i>UNEMPLOYMENT_RATE</i>        | 6.744534 | 6.726697 | 8.836008 | 5.060660  | 49           |
| <i>INDEX_OF_INDUSTRIAL_PROD</i> | 95.28099 | 97.36464 | 107.0436 | 74.94011  | 49           |
| <i>CONSUMER_PRICE_INDEX</i>     | 106.6765 | 108.6817 | 175.5053 | 56.65882  | 49           |
| <i>BRENT_PRICE</i>              | 76.82388 | 74.75000 | 121.2000 | 26.17000  | 49           |

**Figure 4.1 The Graphic Representation of Variables**

*Source: Own computations*

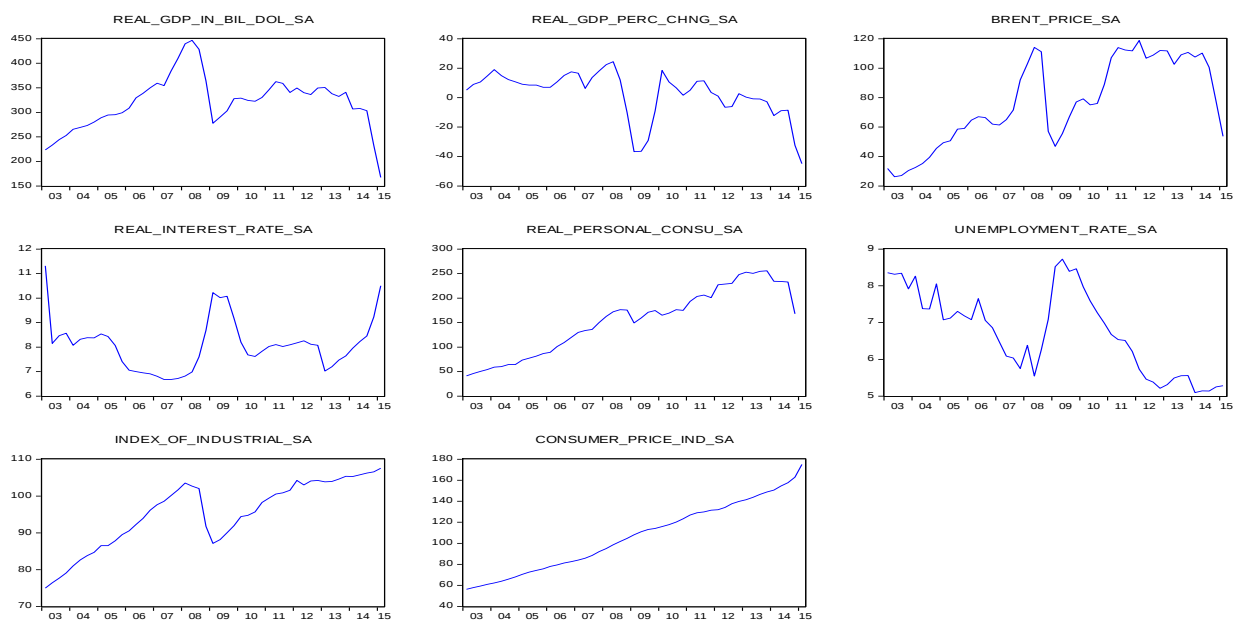


### 4.1.3 Seasonality

Since the empirical part works with seasonal quarterly data, it necessary to deal with problem of seasonality. As one may see on the figures above, especially real GDP is very seasonal so the function of Census X12 is used for seasonal adjustments of variables. From the following figures below it can be concluded that seasonality of variables was successfully removed.

**Figure 4.2 The Graphic Representation of Seasonality Removed Variables**

*Source: Own Computations*



### 4.1.4 Stationarity

The empirical part works with time series, so it is necessary to test stationarity of variables, otherwise results could be biased. From the table below it is visible that data are stationary and non-stationary. To test stationarity more formally the Augmented Dickey Fuller test was used, which has null hypothesis that variable is non-stationary and by rejecting the null hypothesis it was allowed to accept alternative hypothesis of stationarity of the series (Verbeek, 2012). The results of the stationarity testi are presented below in the table. Finally as opposed to the previous statement, all variables were found to be non-stationary. To deal with non-stationarity we created first differences, respectively second differences and tested the stationarity of the variables again. Most of the

variables were found as stationary after taking first difference. The exception is *REAL\_PERSONAL\_CONSUMP*, which was stationarized after taking second differences.

**Table 4.2 Results of Stationarity Testing**

*Source: Own Computations*

| Variable                          | Type of the test | Prob. | Result on 5% significance |
|-----------------------------------|------------------|-------|---------------------------|
| <i>REAL_GDP_IN_BIL_DOLLARS</i>    | Constant         | 0.36  | Non Stationary            |
| <i>D_REAL_GDP_IN_BIL_DOLLARS</i>  | Constant         | 0.02  | Stationary                |
| <i>REAL_GDP_PERC_CHNG</i>         | Constant         | 0.06  | Non Stationary            |
| <i>D_REAL_GDP_PERC_CHNG</i>       | Constant         | 0.00  | Stationary                |
| <i>REAL_INTEREST_RATE</i>         | Constant         | 0.63  | Non Stationary            |
| <i>D_REAL_INTEREST_RATE</i>       | Constant         | 0.00  | Stationary                |
| <i>REAL_PERSONAL_CONSUMP</i>      | Constant         | 0.40  | Non Stationary            |
| <i>D_REAL_PERSONAL_CONSUMP</i>    | Constant         | 0.90  | Non Stationary            |
| <i>D_REAL_PERSONAL_CONSUMP</i>    | Constant+Trend   | 0.01  | Stationary                |
| <i>D_D_REAL_PERSONAL_CONSUMP</i>  | Constant         | 0.00  | Stationary                |
| <i>UNEMPLOYMENT_RATE</i>          | Constant         | 0.55  | Non Stationary            |
| <i>D_UNEMPLOYMENT_RATE</i>        | Constant         | 0.00  | Stationary                |
| <i>INDEX_OF_INDUSTRIAL_PROD</i>   | Constant         | 0.35  | Non Stationary            |
| <i>D_INDEX_OF_INDUSTRIAL_PROD</i> | Constant         | 0.00  | Stationary                |
| <i>CONSUMER_PRICE_INDEX</i>       | Constant         | 0.99  | Non Stationary            |
| <i>CONSUMER_PRICE_INDEX</i>       | Constant         | 0.99  | Non Stationary            |
| <i>D_CONSUMER_PRICE_INDEX</i>     | Constant         | 0.01  | Stationary                |
| <i>BRENT_PRICE</i>                | Constant         | 0.12  | Non Stationary            |
| <i>D_BRENT_PRICE</i>              | Constant         | 0.00  | Stationary                |

## 4.2 Analysis

As I explained in methodology, the method of analysis is regression analysis of time series based stationary variables. The estimated model is presented below. Firstly, I conduct econometric verification of the model and secondly statistical verification.

### 4.2.1 Econometric verification

From econometric point of view I need to deal with potential problems of multicollinearity, heteroscedasticity and autocorrelation. Problems coming from autocorrelation and heteroscedasticity were solved using robust standard errors estimation technique (Wooldridge, 2012). The level of multicollinearity was tested using Variance Inflation Factors test. Results of the test are presented bellow and all centred values were lower than 10, what leads to a conclusion that the level of collinearity is acceptable.

**Table 4.3 Variance Inflation Factors**

*Source: Own Computations*

Date: 11/26/15 Time: 17:21  
Sample: 1994Q1 2015Q1 IF YEAR>2002  
Included observations: 46

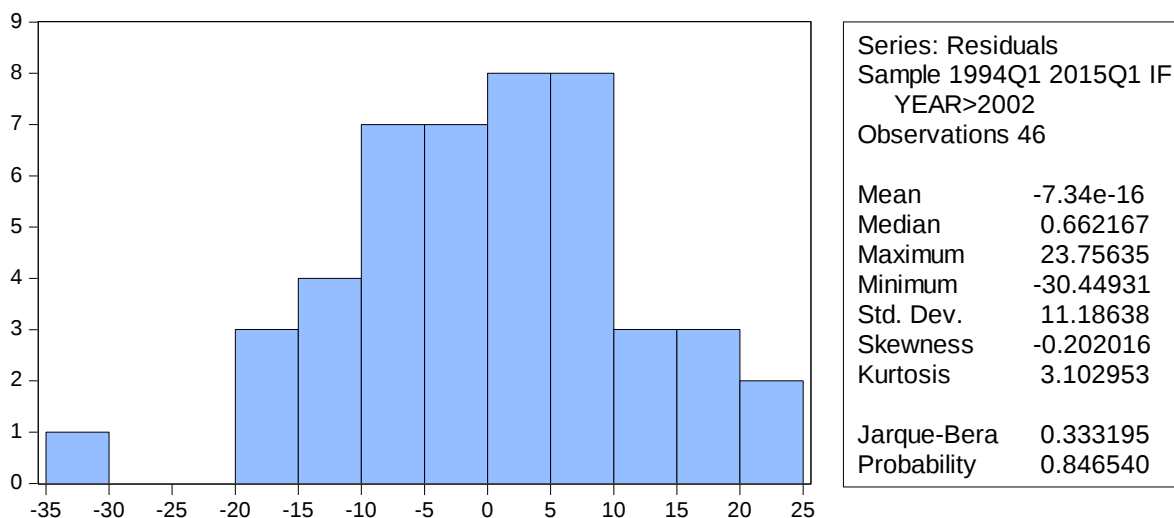
| Variable                 | Coefficient<br>Variance | Uncentered<br>VIF | Centered<br>VIF |
|--------------------------|-------------------------|-------------------|-----------------|
| C                        | 23.95979                | 9.989457          | NA              |
| D_BRENT_PRICE_SA         | 0.132015                | 9.223828          | 9.222826        |
| D_UNEMPLOYMENT_RATE_SA   | 32.10557                | 4.380438          | 4.082753        |
| D_REAL_INTEREST_RATE_SA  | 49.11773                | 5.541819          | 5.482813        |
| D_CONSUMER_PRICE_IND_SA  | 4.837122                | 10.18321          | 2.745696        |
| D_INDEX_OF_INDUSTRIAL_SA | 1.874667                | 3.347682          | 3.140947        |
| DD_REAL_PERSONAL_CONSU   | 0.022653                | 2.236829          | 1.990602        |

### 4.2.2 Statistical verification

From statistical point of view it is required to deal with normality of residuals, statistical significance of variables and explanatory power of the model. The test of normality residuals Jarque Berra was not able to reject the null hypothesis of normally distributed residuals, so this assumption is fulfilled and can be observed on the figure below.

**Figure 4.4 Jarque Berra Test**

Source: Own Computations



On 5% level of statistical significance the null hypothesis of non-significance of the model is rejected and therefore the alternative one could be accepted, which tells us that the model as a whole is statistically significant. Using level of statistical significance 10 % level, it is able to reject the null hypothesis of non-significance of variables for variables: *D\_BRENT\_PRICE\_SA*, *D\_REAL\_INTEREST\_RATE\_SA*, *D\_INDEX\_OF\_INDUSTRIAL\_SA*, *DD\_REAL\_PERSONAL\_CONSU*. It can be said that these variables were found to be statistically significant. On the level of statistical significance 5 % only the variable representing second difference of real personal consumption was found to be statistically significant. The biggest contribution to the explanatory power of the model was by variable representing Brent Price, which was measured using estimated model only with the variable Brent Price. R-Squared informs us that the model as a whole explains 77 % of variability of dependent variable *D\_REAL\_GDP\_IN\_BIL\_DOL\_SA*, what can be observed on the table below.

**Table 4.4 The Outcomes of the Model***Source: Own Computations*

Dependent Variable: D\_REAL\_GDP\_IN\_BIL\_DOL\_SA

Method: Least Squares

Date: 11/26/15 Time: 16:45

Sample: 1994Q1 2015Q1 IF YEAR&gt;2002

Included observations: 46

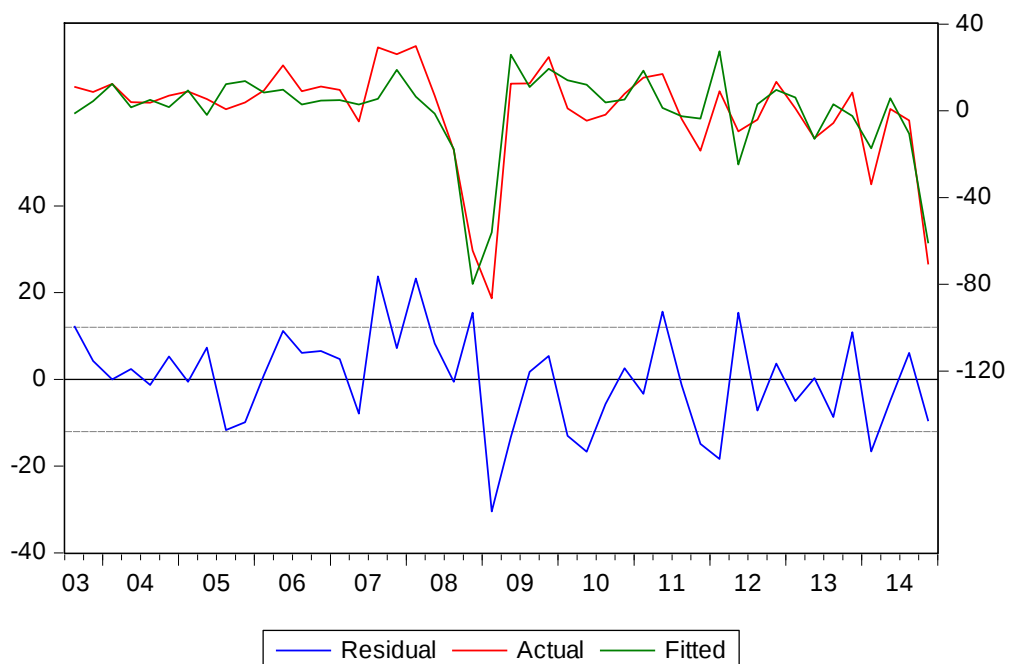
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed  
bandwidth = 4.0000)

| Variable                        | Coefficient | Std. Error         | t-Statistic | Prob.     |
|---------------------------------|-------------|--------------------|-------------|-----------|
| <i>C</i>                        | 1.600039    | 4.894874           | 0.326881    | 0.7455    |
| <i>D_BRENT_PRICE_SA</i>         | 0.617170    | 0.363338           | 1.698608    | 0.0974    |
| <i>D_UNEMPLOYMENT_RATE_SA</i>   | -1.493022   | 5.666178           | -0.263497   | 0.7936    |
| <i>D_REAL_INTEREST_RATE_SA</i>  | -13.37166   | 7.008405           | -1.907947   | 0.0638    |
| <i>D_CONSUMER_PRICE_IND_SA</i>  | -1.308438   | 2.199346           | -0.594922   | 0.5553    |
| <i>D_INDEX_OF_INDUSTRIAL_SA</i> | 2.530540    | 1.369185           | 1.848209    | 0.0722    |
| <i>DD_REAL_PERSONAL_CONSU</i>   | 0.496805    | 0.150510           | 3.300811    | 0.0021    |
| R-squared                       | 0.770750    | Mean dependent var |             | -0.012730 |
| Adjusted R-squared              | 0.735480    | S.D. dependent var |             | 23.36333  |
| S.E. of regression              | 12.01610    |                    |             |           |
| Sum squared resid               | 5631.084    |                    |             |           |
| Log likelihood                  | -175.8417   |                    |             |           |
| F-statistic                     | 21.85328    |                    |             |           |
| Prob(F-statistic)               | 0.000000    |                    |             |           |
| Prob(Wald F-statistic)          | 0.000000    |                    |             |           |

The explanatory power of the model is also depicted with help of the figure below. This figure represents fitted and actual variables of the dependent variable and from the graph we can see, that the fitting was good.

**Figure 4.5 Fitted Values by the Model against Actual Values**

*Source: Own Computations*



### 4.3 Interpretation of Results

Estimated model is shown below again in the form of equation. As it was mentioned before, the highest explanatory power has the variable representing the Brent Price of oil. According to the author's assumption, the price of Brent oil is positively associated with the real GDP of Russian Federation. It is also required to mention that the model was adjusted with help of differences. Differences are an absolute change in variable. So if the differences are taken, the results should be interpreted as absolute changes (dynamically), which positively or negatively affect dependent variable. Thus the interpretation of results in units (numbers) is not common, that's why just positive or negative impact will be observed.

Results showed that there was a positive relationship between the price of Brent and the real GDP of Russian Federation in examined period. It means that **Increase in Brent price of oil led ceteris paribus to increase of real GDP of Russian federation in the examined period.** Thus the assumed hypothesis of positive dependence between oil price changes and real GDP of Russian Federation has been confirmed. As was stated before, Russian Federation is very dependent on

exports of oil and consequently on revenues from it. In fact, several month after the performance of recent negative oil price shock, Russia have received 42% less of revenue from oil exports in 2015 (Q1), taking into account comparison with the previous quarter in 2014<sup>25</sup>. In the beginning of 2014, Russian budget's functioning was predetermined for the price of oil more than 100\$<sup>26</sup>, but the negative oil price shock occurred and Russian budget was distorted. The fiscal policy was forced to decrease real government spendings (base year 2008) as a % of GDP by 1,7% in 2015(Q1), comparing with previous quarter 2014.<sup>27</sup> It was theoretically determined by Anshasy (2009a,b) that the fiscal policy is able to decrease government spending during lower oil prices, due to its procyclical nature. Therefore the results, which are interpreted with help of foregoing statements can say that Russian real GDP was exactly decreased during negative oil price shocks in 2009 and 2014-2015 as was assumed in previous sections and also increased during positive in 2004-2008, due to positive dependence between oil prices and real GDP.

Also results indicated that there was a negative relationship between the real long-term interest rate and real GDP of Russian Federation. **Increase in real long term interest rate led ceteris paribus to decrease of real GDP of Russian federation in the examined period.** Increasing real interest rate as was showed in the theoretical part, can be a bad scenario for production and production development, as the cost for money increased, making the loans more expensive, which becomes difficult for production firms to take loans and repay them. In the frame of the Russian economic background, during the negative oil price shock 2014-2015 Russian ruble exhibited large depreciation towards U.S dollar by more than 45%<sup>28</sup>. In line with theoretical part (and so called intermediate transition mechanism), the effect of nominal exchange rate was translated into the economy. The negative effect of national currency on Russian economy has caused large inflationary pressures, followed by inflation targeting monetary régime with floating nominal exchange rate. Furtherly, the real interest rate was increased by 3%<sup>29</sup>. Such decision was dramatic for production industry. As a result, the fall in real GDP may be the case. Thus results indicate that there is positive relationship between industrial production index and real GDP of Russian Federation, which is in line with previous statements. **Increase in industrial production index led ceteris paribus to increase of real GDP of Russian federation in the examined period.**

---

<sup>25</sup> Data was taken from Reuters (2015)

<sup>26</sup> Data was taken from Reuters (2015)

<sup>27</sup> Data was taken from Russian Statistical Office (2015)

<sup>28</sup> Data was taken from Russian Statistical Office (2015)

<sup>29</sup> Data was taken from Central Bank of Russia (2015)

Moreover it was found that real personal consumption expenditures have also positive sign with real GDP. **Increase in real personal consumption expenditures led ceteris paribus to increase of real GDP of Russian federation in the examined period.** It can be stipulated by the contribution of real personal consumption expenditures on the economy's outputs and goods to real GDP. Overall taking into account the positive sign between those variables, it means that lower amount of real personal consumption expenditures will lead to lower real GDP. It can be observed on concrete example in Russia, when real personal consumption expenditures (base year 2008) during the beginning of the recent negative oil price shock in 2014 (Q4) diminished by 3,5% in comparison with analogical quarter in previous period<sup>30</sup>. Thus, the decreasing nature of real GDP during the last oil price shock can be also the case, because of positive relationship with real personal consumption expenditures.

And lastly mentioning non-significant variables unemployment rate and consumer price index, results indicated **negative relationship with real GDP** of Russian Federation. Higher unemployment tends to be bad phenomena because of decreased level of incomes, production and wealth in society and creates additional pressure on government budget. It can be showed in the example where the unemployment rate in Russia was increased by 3,9% in 2015(Q1)<sup>31</sup> in comparison with the analogical period in previous year, just some time after the negative oil price shock occurred. That's why the negative relationship can be explained and unemployment is additional negative factor for real GDP. Higher level of consumer price index reduces purchasing power of consumers making the consumers less wealthy because of depreciated currency. As result the redistribution of national income and wealth can happen and the volume of production can be decreased due to indeterminate production development perspectives (was already stated in third paragraph). That's why the negative relationship between these variables and real GDP can be explained. Thus all the interpreted results estimated to be very consistent and can be observed below.

#### Figure 4.6 Estimated model's results

Source: Own Computations

$$D\_REAL\_GDP\_IN\_BIL\_DOL\_SA = 1.60 + 0.62 * D\_BRENT\_PRICE\_SA - 1.49 * D\_UNEMPLOYMENT\_RATE\_SA - 13.37 * D\_REAL\_INTEREST\_RATE\_SA - 1.31 * D\_CONSUMER\_PRICE\_IND\_SA + 2.53 * D\_INDEX\_OF\_INDUSTRIAL\_SA + 0.50 * DD\_REAL\_PERSONAL\_CONSU$$

<sup>30</sup> Data was taken from Federal Reserve Bank of St. Louis (2015)

<sup>31</sup> Data was taken from Russian Statistical Office (2015)

## **4.4 Potential Drawbacks and Improvements**

Determining of empiric analysis, some moments of course made the process very difficult, but there But there is also space for improvements.. First of all it would be much better to find more data for making the verification of foregoing hypothesis, as it would make the model more precise and effective, but it was not possible to find the data for all variables before 2003. And secondly more suitable could be performing VAR analysis, which allows to construct impulse response function, which would make the empirical analysis more valuable.

## **Conclusion**

This thesis aims to analyze the relationship between price of oil taken as Brent and real GDP of Russian Federation. The author was inspired in his analysis after exhibition of negative oil price shock in Russian Federation in 2014-2015. At the very beginning, the crucial supplementary aim was to understand factors, which induce the oil prices to change. Moreover it was important to specify throughly the specific character of world oil market before analyzing the concrete economy, which is Russian economy. It was stated that oil price formation mechanism and change in price of oil is identical thing, which can be influenced by four main factors: oil supply or in other words oil production (which was statistically and theoretically observed and divided into OPEC and non-OPEC), oil demand (or oil consumption), futures markets and speculations and oil inventories (or reserves). It was understood that oil market is very volatile and every factor above can have influence on world oil prices. Furthermore the nature of oil price shocks, which due to its characteristics can be unexpectedly positive or negative. Various factors and events are responsible for oil price shocks such as wars, world economic crisis and pro-political incentives. At last it was necessary to theoretically segregate different economic effect of oil price shocks on oil-exporting and oil-importing countries, taking into account both the world perspective and concrete assumptions towards Russian Federation economy. Theoretically it was assumed that oil-importing countries are negatively affected by positive oil price shocks, whereas oil-exporting countries positively and vice versa. Then there were described the main factors and transmission mechanisms of affection by oil price shocks for oil-importing countries and for oil-exporting countries. Regarding the latter, it was investigated that their economies can be affected mainly through fiscal policy mechanisms, more precisely through government spending and revenues received from oil

exports. Fiscal policy proved to be pro-cyclical and during negative (positive) types of shocks the government spendings can be decreased (increased to fund the budget). It was known that it entails the different macroeconomic indicators such as investments, consumption and income to change also in pro-cyclical way. Additionally it was theoretically assumed that real- and nominal exchange rates can serve also as transmission mechanisms for oil price shocks and be the link with monetary policy, the decisions of which can define the further way of economy. Lastly, the economy of Russian Federation was researched and it was confirmed, that Russia is very sufficient oil-exporter. Then to make the precise thought and connect the events and points of inspiration, it was investigated and defined the movement of oil prices for the last 10 years, especially during oil price shocks in 2009 and 2014-15. It was important to analyze its reasons and statistical information about real Russian GDP to make assumption toward the main hypothesis, whether oil prices can have the effect on the real Russian GDP. To take this fact into account the thesis has approached for verifying the main hypothesis and constructed the empirical model. After statistical and economic verification, there were interpreted results and it was found out that there was a positive relationship between the price of the Brent and the real GDP of Russian Federation in examined period. Lastly the main hypothesis was confirmed. It can be concluded that Russian real GDP truly can be affected by the price of oil and outward world economic policies on oil market. These results are in line with events of lower prices in 2009 and 2014-2015 followed by real Russian GDP decline. On the contrary, during 2004-2008 the real GDP was increasing. It goes without saying that it can be explained by high dependence on oil revenues, pro-cyclical fiscal policy, monetary policy remedies and nominal exchange rate as intermediate transmission mechanism. Furtherly, real personal consumption expenditures and index of industrial production were found also positively related to the real Russian GDP. But real long-term interest rate found out to be negatively related to real GDP. All these explanatory variables were proved to be statistically significant, whereas unemployment and consumer price index were mentioned as statistically insignificant and were found negatively related to real GDP of Russia.

## References

AZIZ, M.I “Oil Price & Exchange Rate: A Comparative Study between Net Oil Exporting and Net Oil Importing Countries.” *ECONOMIC REVIEW PAPER*, 2009, pp. 7-10

BERUMENT, M.H, BASAK CEYLAN, N., and DOGAN, N. “The Impact of Oil Price Shocks on the Economic Growth of Selected MENA Countries.” *ENERGY JOURNAL*. 31(1), 2010, pp. 149-176

British Petroleum. URL: [www.bp.com](http://www.bp.com)

Bruegel Research Agency. URL: <http://bruegel.org/>

BUETZER, S., HABIB, M.M and STRACCA, L. “Global Exchange Rate Configurations. Do Oil Shocks Matter?” *WORKING PAPER SERIES*. No 1442, June 2012, pp. 6-10

CANTORE, N., ANTIMIANI, A., and ANCIAES, P.R. “Energy Price Shocks. Sweet and Sour Consequences for Developing Countries.” *WORKING PAPER*. No 355, August 2012, pp.2-10

Central Bank of Russia; URL: <http://www.cbr.ru/eng/>

Central on Global Energy Policy; URL:  
[http://energypolicy.columbia.edu/sites/default/files/energy/CGEP\\_American%20Gas%20to%20the%20Rescue%3F.pdf](http://energypolicy.columbia.edu/sites/default/files/energy/CGEP_American%20Gas%20to%20the%20Rescue%3F.pdf)

DABROWSKI, M. “The Impact of the Oil-Price Shock on Net Oil Exporters.” *ECONOMIC ARTICLE*. November 2015. Retrieved from: <http://bruegel.org/2015/11/the-Impact-of-the-Oil-Price-Shock-on-Net-Oil-Exporters/>

DALE, S. “New Economics of Oil.” October 2015, pp. 2-3

EL ANSHASY, A. “Oil Prices and Economic Growth in Oil-Exporting Countries.” *RESEARCH PAPER*. 2009a, pp. 2-5

EL ANSHASY, A. “Oil Price Volatility and the Fiscal Response in Oil-Exporting Countries.” *RESEARCH PAPER*. August 2009b, pp. 12-20

EL ANSHASY, A, and BRADLEY, M. “Oil Prices and the Fiscal Policy Response in Oil-Exporting Countries.” *RESEARCH PAPER*. August 2011, pp. 606-618

FARZANEGAN, M.R, and MARKWARDT, G. “The Effects of Oil Price Shocks on the Iranian Economy.” *ENERGY ECONOMICS*. №31 (1), 2009, pp. 134-151

Federal Reserve Bank of St. Louis; URL: <https://www.stlouisfed.org/>

GHALAYINI, L. "The Interaction between Oil Price and Economic Growth." *REVIEW OF MIDDLE EAST ECONOMICS AND FINANCE*. №13, 2011, pp. 128

HAMILTON, J.D. "Historical Causes of Postwar Oil Shocks and Recessions." *RESEARCH REPORT*. 1979, pp. 111

HAMILTON, J.D. "What Is an Oil Shock?" *WORKING PAPER*. №7555, June 2000, pp. 28-34

HELLEVIG, J. "Putin 2000-2014. Midterm Interim Results: Diversification, Modernization and the Role of the State in Russian Economy." *ANALYTICAL PAPER*. December 2014, pp. 12-13

ITO, K. "Oil Prices and Macro-Economy in Russia: The Co-Integrated VAR Model Approach." *Fukuoka University*. 2008, pp. 37-40

Jiménez-Rodríguez, R., and Sánchez, M. "Oil Price Shocks and Real GDP Growth. Empirical Evidence for Some OECD Countries." *RESEARCH PAPER*. April 2003, pp. 2-7

Jiménez-Rodríguez, R., and Sánchez, M. "Oil Price Shocks and Real GDP Growth. Empirical Evidence for Some OECD Countries." *WORKING PAPER SERIES*. No 362, May 2004, pp. 7-9

KILIAN, L. "Oil Price Shocks: Causes and Consequences." *WORKING PAPER*. 2014, pp.7-8

KUTASOVIC, P.R. "Changes in Supply of and Demand for Crude Oil: Implications for Oil Price." *NMIMS MANAGEMENT REVIEW*. April-May 2012, pp.8-13,

LOMBARDI, J., and I. VAN ROBAYS. "Do Financial Investors Destabilize The Oil Price?" *WORKING PAPER*. No 1346, June 2011, pp. 10-11

Urals Oil; URL: [www.nefturals.ru](http://www.nefturals.ru)

Oil Market Intelligence; URL: <http://www.energyintel.com/>

Platts Agency; URL: <http://www.platts.com/>

RAUTAVA, J. "Oil Prices, Excess Uncertainty and Trend Growth. A Forecasting Model for Russia's Economy." *ECONOMETRICS PAPER*. 2013, pp. 77-87

Reuters Financial Agency; URL: [www.reuters.com](http://www.reuters.com)

RUSSELL, M. "The Russian Economy. Will the Russia Ever Catch Up?" *IN-DEPTH ANALYTICAL PAPER*. March 2015, pp.3-4

Russian Statistical Office; URL: <http://www.gks.ru/>

SHAFI, K, and L HUA. "Oil Prices Fluctuations & Its Impact on Russian Economy; An Exchange Rate Exposure." *ASIAN JOURNAL OF ECONOMIC MODELLING*. №2 (4), 2014, pp.169-177

SILL, K. "The Macroeconomics of Oil Shocks." *BUSINESS REVIEW*. Q1 2007, pp. 21-22

TANG, W., WU, L., and ZHANG, Z. "Oil Price Shocks and Their Short- and Long-Term Effects on the Chinese Economy." *ECONOMIC JOURNAL*. January 2010, pp.3-4

TAYLOR, J., and P. VAN DOREN. "The Case against the Strategic Petroleum Reserve." *POLICY ANALYSIS*. November 2005, pp.3-5

UMAR, G, and K.A ABDULHAKEEM. "Oil Price Shocks and the Nigerian Economy: A Variance Autoregressive (VAR) Model." *INTERNATIONAL JOURNAL OF BUSINESS AND MANAGEMENT*. №5 (8), 2010, pp. 39-49

U.S Energy Information Administration; URL: <https://www.eia.gov/>

VERBEEK, M. "A Guide to Modern Econometrics." 4th Ed. Chichester: Wiley, 2012, pp. 497, ISBN 978-1-119-95167-4

WOOLDRIDGE, J. "Introductory Econometrics: A Modern Approach." *CENGAGE LEARNING*. 2012

World Bank. URL: <http://data.worldbank.org/>

АЗАРОВА, А.И., "Влияние Факторов Развития Нефтяной Отрасли на Ценообразование Нефти." *ПРОБЛЕМЫ УЧЕТА И ФИНАНСОВ*. №1, 2012, с. 37 (AZAROVA.A.I. Vliyanie Faktorov Razvitiya Neftyanoi Otrastli Na Tsenoobrazovanie Nefti,2012, pp.37)

БОБЫЛЕВ, Ю.Н., и Д.Н. ЧЕТВЕРИКОВ. "Факторы Развития Рынка Нефти," – Москва: ИЭПП, 2006, с. 7-39 (Yu.N. Bobylev, D.N. Chetverikov. Factors for the Oil Market Development, - 2006, pp. 7-39)

БУШУЕВ, В.В., КОНОПЛЯНИК, А.А и Я.М МИРКИН. "Цены на нефть: Анализ, Тенденции, Прогноз." *ЭКОНОМИЧЕСКАЯ НАУЧНАЯ РАБОТА*. 2013, с. 13-81 (BUSHUEV V.V, KONOPLYANIK A.A, MIRKIN YA.M. EKONOMICHESKAYA NAUCHNAYA RABOTA.2013, pp. 13-81)

ВАСИЛЬЕВА., Ю. П. "Экономика Стран Экспортеров Нефти (ОПЕК)." *ЭЛЕКТРОННЫЙ НАУЧНЫЙ ЖУРНАЛ «Нефтегазовое дело»*. №6, 2012, с. 583 (VASILJEVA, U.P. Ekonomika Stran Eksportyrovov Nefti (OPEC). ELEKTRONNY NAUCHNIY ZHURNAL "Neftegazovoe Delo", №6, 2012, pp. 583)

ДАШЕВСКАЯ., О.В, и Т.Р БАБАЛОВ. “Нефтяные Кризисы в Мировой Экономике.”  
*ВЕСТНИК ВОСТОЧНО-ЕВРОПЕЙСКОГО УНИВЕРСИТЕТА ЭКОНОМИКИ И  
МЕНЕДЖМЕНТА. Vol.13, №3, 2012, с. 44-45 (DASHEVSKAYA O.V, BABALOV T.R. Neftyanye  
Krizisy V Mirovoi Ekonomike. VESTNIK VOSTOCHNO-EVROPEJSKOGO UNIVERSITETA  
EKONOMIKY I MANAGEMENTA. Vol.3, №13, 2012, p.44-45)*

МЕЛЬНИКОВ., Р.М. “Влияние Динамики Цен на Нефть на Макроэкономические Показатели  
Российской Экономики.” *ПРИКЛАДНАЯ ЭКОНОМЕТРИКА. №17(2), 2010, с. 20-29*  
*(MELNIKOV R.M. Vliyanie Dinamiky Cen Na Neft' Na Macroeconomicheskie Pokazateli Rossijskoi  
Ekonomiky. PRIKLADNAYA EKONOMETRIKA. Vol. 1, №17, 2010, pp.20-29)*