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The Russian Oil and Gas companies under sanctions and the oil price collapse

Master dissertation

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PREFACE

The dissertation ‘The Russian Oil and gas companies under sanctions and the oil price collapse’ has been written to meet the graduation requirements of the EGEI Master’s degree program. I was engaged in researching and writing this dissertation from January to September of 2019.

I want to thank my supervisor, Ing. Ilya Bolotov, MBA, Ph.D., for his excellent guidance, constructive remarks, ongoing support but also motivation throughout this master dissertation’s entire writing process.

DECLARATION OF AUTHORSHIP

I, Aitbaev Timur, declare that the dissertation ‘The Russian Oil and gas companies under sanctions and the oil price collapse’ has been written by myself and all results presented are my own. The sources of the literature are listed in the section References.

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LIST OF ABBREVIATIONS

BBL	Barrel
CIS	Commonwealth of Independent States
CBR	Central Bank of Russian Federation
ECB	European Central Bank
EU	European Union
G7	Group of Seven (Canada, France, Germany, Italy, Japan, United Kingdom, United States).
G8	Group of Eight (Canada, France, Germany, Italy, Japan, Russia, United Kingdom, United States).
GDP	Gross Domestic Product
IEA	International Energy Agency
IMF	International Monetary Fund
NATO	North Atlantic Treaty Organization
OECD	Organization for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
CPI	Consumer Price Index
RUB	Ruble
RUS	Russian Federation
UA	Ukraine
UK	United Kingdom
USA	United States of America
USD	United States Dollar
UZB	Uzbekistan
WB	World Bank
LPR	Luhansk People's Republic
DNR	Donetsk People's Republic
MICEX	Moscow Interbank Currency Exchange

INTRODUCTION

The relevance of the selected topic is that oil plays an essential role in the development of the world economy and international trade. The Russian Federation, which has vast oil reserves and developed the oil industry, has traditionally been one of the largest exporters of these raw materials to the world market. At the same time, the oil industry is a significant component of Russia's social and economic development and has a direct impact on other sectors of the economy. A substantial share of the Russian budget revenues comes from oil exports.

However, since 2014, the Russian economy has been experiencing a crushing burden, primarily related to sanctions and falling oil prices. Efficiency indicators of Russian oil and gas companies are falling, which directly affects competitiveness in the global market. This situation is also detrimental to other sectors of the economy. Moreover, Russia's oil and gas industry is enormous and has a massive impact on several countries such as CIS (they have many trade agreements, and some sizeable Russian oil and gas companies do business in these countries). The weakening of the Russian economy could have a significant impact on the economies of the CIS countries, which are directly dependent on the Russian oil and gas industry.

The motivation of choosing 'The Russian oil and gas companies under sanctions and the oil price collapse' comes from the interest of the author in the economics of oil and gas industries (the author has a bachelor's degree in economics of the oil and gas industry). Moreover, the oil and gas industry of Russia and the country's economy has a direct impact on the economy of Uzbekistan (the land of the author). First, Uzbekistan, as an oil and gas producing country, has several trade agreements with Russia. Secondly, the largest Russian oil and gas companies, both 'Lukoil' and 'Gazprom,' operate in Uzbekistan. Consequently, any changes in the oil and gas industry of Russia entail changes in the economic growth of Uzbekistan.

The sanctions imposed have affected many aspects of the lives of Russians and the Russian economy and have become a predetermining factor in Russian economic policy in the coming years. It is challenging to predict when the sanctions will be lifted, and whether they will be raised shortly, so Russia, and its oil and gas industry, is likely to have to adjust its economic policy to the existing restrictions for several more years, and perhaps even decades.

The abovementioned fact is, in no small extent, a determinant of the relevance of this work. In addition, the urgency is due to the extremely high importance of the oil and gas sector in the Russian economy. Moreover, the topic of this study is relatively new, so very few papers have been written on it, and most of the articles have not used empirical methods to assess the impact.

The sanctions had an impact on Russian companies in the oil and gas industry and, accordingly, had a potential impact on their capitalization. At about the same time, however, global oil prices fell sharply, and this factor has naturally reflected the capitalization of oil companies. They were also affected by some other factors, such as a sharp fall in the Ruble exchange rate, a decline in foreign direct investment and some others. Thus, the capitalization of the oil and gas companies may have been affected not only by sanctions but also by other factors, perhaps even more so, as suggested in some studies (Gurvich and Prilepskiy, 2016) and (Domanska and Kardas, 2016).

In the upper mentioned economic and political situation for the oil and gas industry in Russia, the issue of valuation of oil and gas companies is relevant. The capitalization of companies shows the competitiveness, performance, and prospects for the future development of the company.

The author of this thesis aims to test hypotheses using economic and econometric analyses:

Hypothesis 1 (H1): The official imposition of sanctions by the US, EU, and other countries had a negative impact on the capitalization of companies in the Russian oil and gas sector. Since the paper investigates not the effect of economic

and political news on the capitalization of the organizations under consideration, but the effect of sanctions (limited access to foreign credit, a ban on technology exports to Russia), it makes sense to take as a starting point the date when the sanctions were officially announced.

Hypothesis 2 (H2): The targeting of sanctions at a company on the list of companies under consideration affects its share price. As mentioned above, such a company becomes limited in terms of receiving foreign loans (sanctions implied a ban on lending for more than 90 days), its assets were frozen, and cooperation with international companies ceased.

Hypothesis 3 (H3): The type of ownership of Russian oil companies negatively affects their capitalization. Since sanctions were imposed on oil companies and the state as a whole, Russian state-owned oil companies suffered more because foreign banks and investors have begun to invest less in state-owned companies to avoid any risks.

Hypothesis 4 (H4): Based on the literature review, a hypothesis was put forward about the positive impact of Brent oil prices and the harmful effects of the dollar exchange rate on the share prices of Russian oil and gas companies.

To achieve the aim mentioned above, the following tasks need to be performed:

1) Review of the literature of the impact of political and economic factors on stock markets and the effect of sanctions on the Russian economy and stock market;

2) Review of the literature of the influence of sanctions and oil price on the exchange rate;

3) Analysis of the oil price collapse and the impact of OPEC agreements on oil prices;

4) Analysis of the current situation in the Russian oil and gas industry and Russian oil and gas companies;

5) Creation of a sample of companies operating in the Russian oil and gas industry;

6) Description of data, justification of the regression model;

7) Conducting a preliminary analysis of data;

8) Creation of several models for panel data to analyze the impact of sanctions on the capitalization of companies;

9) Selecting the most appropriate model;

10) Summing up the results of the study, substantiation of the results obtained.

11) Discussion and comparison of the results with other economic papers related to this question.

The master thesis is structured as follows: Chapter 1 is devoted to a review of the literature on this topic. First of all, the literature that analyzes the influence of political and economic factors on the stock markets of different countries and the impact of sanctions on the Russian stock market will be considered. The following literature review will focus on the effects of sanctions and the collapse of oil prices on the exchange rate. Chapter 2 includes an analysis of the oil price collapse and the current situation of the Russian oil and gas industry. This chapter will also focus on the leading Russian oil companies and the analysis of Russia's currency and stock markets. Chapter 3 is devoted to the justification of the model specification, description of statistical data and empirical analysis, including a preliminary analysis of data (descriptive statistics), correlation analysis, data validation for heteroscedasticity and construction of various models of panel data analysis. After that, the most appropriate model will be selected, and based on the results of the analysis, the results of the analysis will be summed up, and conclusions will be presented.

1.LITERATURE REVIEW

The review of the literature has been made with the use of database Google Scholar and an electronic library of the University of Lille, the University of Bari Aldo Moro, the University Economics in Prague, and 'EBSCO-Russia' for the search of the full-text articles connected with a theme of the dissertation. Moreover, in this thesis were used electronic resources from the official sites of the World Bank, the European Union, and the OECD, as well as the annual publication of the Gaidar Institute on the Russian economy. For statistical data, the author used official sites of statistics of the Russian Federation and the Russian central bank official website. To search for data on daily share quotes of Russian oil and gas companies, the author took data from the investing.com portal.

The author divided the literature review into three parts. The first part of the thesis will consider studies of several economists about the impact of world events (political and economic) on the stock market and on Russian. The second part of the thesis is concerned with the literature describing the impact of sanctions on the Russian economy, and the oil and gas industry. The third part will help to understand the causal relationship between the Ruble exchange rate, oil prices, and sanctions, to correctly model and obtain the correct results.

1.1 Influence of political and economic factors on the stock market

There are several works devoted to the analysis of the influence of various macroeconomic and political factors on stock markets. Such factors can be very different: they include, for example, macroeconomic shocks, such as changes in world oil prices, or political announcements, including the imposition of international sanctions.

One of the fundamental studies of the impact of news or events on stock markets was the work of Nederhoffer (1971). To analyze the impact of the news on US stock prices, the author used the headlines of two of the most respected US

newspapers (the Los Angeles Times and the New York Times), dividing them into categories: "bad," "neutral" and "good" news. Share prices were considered in the 1950-1966 period. Based on the results of the study, the author concludes that world events have a severe impact on US stock prices.

A similar study was conducted in 1989 (Cutler, Potterba, Summers, 1989). The authors take facts from the Chronology of Important World Events, which have the potential to affect the market, over a period from 1941 to 1987. Further, they note the percentage changes in stock indices on the days when the events in the sample occurred. Strange as it may seem, the authors' hypotheses were not confirmed, and the analysis showed that the events had a minimal effect on the market. The authors also decided to check the influence in the opposite way - the days on which there were severe jumps of stock indices in percentage change were singled out, and after that, the authors considered the events that occurred on these days. However, this method did not give the expected result. Even very significant political circumstances did not always have a considerable impact on the market.

Mitchell and Mulherin (1994) found that there is a direct link between news and market activity, and the authors also marked the significance of the news. The authors attributed to the critical news those written in the title on the front page of the American daily New York Times. Researchers concluded that important news has a positive impact on the absolute change in the share price but does not have a significant effect on trading volume. However, Berry and Howe (1994) had the opposite results. Namely, their research shows that there is a meaningful positive connection between public information and trading volume, but there is no significant connection between news and stock market volatility.

There are some studies devoted to the analysis of the impact of sanctions against Iran (one of the biggest oil-exporting country) on the macroeconomic indicators of this country. Sanctions against Iran have been imposed for many years by the United States, the European Union, Canada, Japan, South Korea, and Australia. Sanctions mean a ban on the import of military products, as well as

restrictions on exports to the oil and gas and chemical industries of Iran. Thus, in the work of Amuzegar (1997) as a result of the analysis of the impact of sanctions on the exchange rate of the national currency of Iran for the period from 1984 to 1989, the author concludes that due to sanctions the exchange rate decreased significantly.

Chan, Chui, and Kwok (2001) considered that news of different nature might have a disparate impact on investors' expectations and divided the news into two groups: economic and political. For the sake of clarity, days, when both political and economic news met, were excluded. According to the authors, financial news, as a rule, has a direct impact on the economy and, consequently, on the stock market. However, the economic consequences of political news are less clear. Political news is not directly related to economic activity, and politicians can sometimes deliberately conceal information. Besides, most financial analysts are trained in economics and finance. They are less confident about the impact of political news. They may prefer to wait until political news is clarified before resuming active stock trading. Much of the political news in the paper is related to the Chinese-British negotiations on the Hong Kong broadcast in 1997 and the human rights issue in China. In terms of economic news, most of it is related to Sino-American trade relations. The results are as follows: political news harms price changes, while financial news has a positive impact. This finding is clarified by the authors because the quality of information on significant political events is worse, which in turn leads to less market activity. The authors also note that economic news may affect even before the information is made available to the public. This means that in the case of economic news, there is insider information. As for political events, there is no effect before the announcement.

The work of Hayo and Kutan (2005) refers to the Russian stock market. Oil prices, news, and events on the world financial market were taken as independent factors, and economic news related to the energy industry and political news about the armed conflict in Chechnya were taken as news. As in the previous paper, the

authors divided the news events into three categories: "bad," "neutral," and "good." As for the news related to the war in Chechnya, the positive news was the news that reported about the victories of the Russian army, the negative press about the defeats of Russia or the continuation of the conflict, respectively. As a result of the research, the authors were able to draw the following conclusions:

1. The Russian stock market depends on the events taking place in the global financial market.

2. Return on shares of Russian companies has a severe positive dependence on the growth of oil prices.

3. News related to the energy industry affects the Russian bond market.

4. News related to the war in Chechnya does not affect the bond market.

Economists Fedorova and Pankratov, in their article (Fedorova and Pankratov, 2010) analyze what macroeconomic indicators affect the Russian stock market. The following indicators are considered as factors: the balance of capital flows, the exchange rate of the Ruble to the dollar, world prices of Brent oil and the ratio of EUR/USD exchange rates. The authors used the EGARCH model and data for the period from January 2007 to September 2008. The writers made the following outcomes: the factor that has the most significant impact on the MICEX index is the world price of Brent oil. The next in terms of influence is the change in the U.S. dollar (it should be noted that the impact of the U.S. dollar on the Russian stock market is negative), followed by the ratio of exchange rates of EUR/USD dollar and the balance of capital flows. The authors attribute these results to the fact that Russia, at that time, was the largest supplier of oil products in the world market.

Guidolin and Ferrara (2010) analyze the impact of conflicts on the US stock market. Conflicts are defined as international conflicts. The analysis was based on 101 conflicts from 1974 to 2004. The authors decided to use event analysis as the research method. The research findings showed that almost all disputes somehow influenced the level of oil prices, commodity prices, exchange rates, and stock

market indices. Besides, the authors shared the impact of international and intra-state conflicts, while obtaining that the former has a more significant effect on the above indicators. The authors also divided the conflicts by region. Asia and the Middle East have become the regions with the most definite impact on the US stock markets.

Often, when analyzing the impact of news or events on stock markets, the authors share the effect of political and economic news, as they obviously may have different degrees or directions of influence on stock markets.

Such a study is being conducted by Ghanem and Rosvall (2014). The aim is to understand how equity markets in different countries respond to critical global events. The events were divided into three categories: political (33 news), economic news (15), and disaster-related news (12 news). The stock markets of the following countries were also taken: The United Kingdom, Germany, Sweden, and Finland. The authors took data for the period 1987-2013, also using event analysis as a research method. It is worth noting that political and economic news was divided into "bad" and "good," i.e., news with a negative or positive impact on the political situation in the countries or their economies. Based on the studies, the authors received that positive political news, as well as negative economic news, have an impact on the stock markets of the countries. However, news related to natural disasters does not have such an effect.

1.2 Impact of sanctions on the Russian economy

As this topic is relatively new, similar studies have only begun to appear since the end of 2014. Therefore, this chapter will consider, among other things, articles related to the Russian economy or the Russian stock market as a whole, and not just the oil and gas sector.

There are several points of view on how anti-Russian sanctions have affected the economy of the country. There is an interesting opinion (Nelson, 2014) that since the U.S. market occupies a small share in Russia's trade, the U.S. sanctions

have not had the desired effect, while the EU sanctions have had a more significant impact since there are quite close economic relations between Russia and Europe. Some analysts also argue that sanctions have reduced investor confidence in the Russian economy, and many of them have started to withdraw their funds from Russia.

Gurvich and Prilepsky in their article (Gurvich and Prilepsky, 2015) analyze the impact of sanctions on the Russian economy. The authors model several regressions to assess the impact of sanctions on cash flows. Based on the results of the regression, they draw several conclusions. Besides, to the direct effects, i.e., limited opportunities for foreign lending to banks and companies in the military and the oil and gas sectors financial sanctions have had a quite significant indirect impact on the Russian economy a substantial reduction in foreign direct investment and a decrease in capital inflows to the public debt market. These indirect effects almost tripled the direct impact of financial sanctions. The sanctions against Russia turned out to be quite painful for the real sector indicators. This situation can be explained by the "self-regulation" of the Russian economy, i.e., reduction of capital outflows from Russia. The authors also note the significant ability of the Russian economy to adjust to the situation because of the economy's transition to a floating exchange rate.

There are several articles devoted to the analysis of the consequences of sanctions against Russia. For example, Domanska and Kardas (2016) describe the impact of sanctions on various macroeconomic indicators and sectors of the Russian economy, describing short-term and potential long-term effects. Domanska and Kardas note that Russian companies have started to attract capital from the East (mainly China and India), and have generally coped with the impact of financial and technological sanctions, although the authors note that the effects of sanctions, especially technical sanctions, may be more noticeable in the long run. The authors conclude that sanctions were not the primary source of problems in the economy of Russian Federation and, in particular, in the oil and gas sector,

however, they significantly reduced the ability of the Russian economy to neutralize the consequences of the financial crisis caused by a significant fall in global oil prices and structural problems in the Russian economy.

Mae, in his paper (Mae, 2016) analyzes the impact of the sanctions, specifically on the Russian oil sector. The author analyzes oil exports and production volumes and describes the potential long-term effects of technological sanctions on the Russian oil industry. The author determined that the sanctions did not affect those fields that were already in use and joint ventures, and this allowed Russian companies to increase oil production and exports. However, the writer notes that the lack of funds has forced oil producers to reduce investment, which is likely to result in future cuts in production and exports. The writer also notes that restrictions on technology imports may have a long-term effect, as Russian companies are unable to replace existing equipment with new Russian equipment.

An article by Hoffman and Neuenkirch (2017) analyzes how the Ukrainian conflict affected the stock returns of Ukrainian and Russian companies from 21 November 2013 to 29 September 2014. As part of the study of the impact of this conflict, it is crucial to determine the appropriate indicator for the news, as the stock price may change not only because of the release of certain news but also because of expectations of the version of this news. Therefore, Hoffman and Neuenkirch have been tracking keywords in the report that affect the likelihood of sanctions against Russia, protests, the conflict between countries, and the possibility of a crisis. The model also includes the Moscow Exchange Index (MICEX), the Ukrainian Stock Index (PFTS), the day of the week variable, the S&P 500 (the U.S. stock index based on 500 U.S. companies with the highest capitalization) and the monetary policy variable. As a result of the model construction, the authors concluded that the conflict in Ukraine is a negative factor for both Russian and Ukrainian stock markets. Returns of Russian companies' shares decrease by 0.21 percentage point with the increase of news related to the conflict by 1 percentage point, and the performance of Ukrainian companies

decreases even more - by 0.3 percentage point. Besides, Hoffman and Neuenkirch note that the situation in Ukraine has a more significant impact on the economy of this country than on the Russian one, as it creates long-term negative consequences for Ukraine. The research also concludes that the Russian market is more responsive than the Ukraine market to global news. In general, because this research topic is entirely new, there is very little empirical literature on the impact of sanctions on Russian companies' shares.

1.3 Effects of sanctions and oil price on the exchange rate

This chapter will review scientific papers and articles devoted to the analysis and study of the impact of anti-Russian sanctions on the Ruble exchange rate.

Melnikov, in his paper (Melnikov, 2010) discusses how the dynamics of oil prices affect the macroeconomic performance of the Russian economy. In his study, the author built a system of regression equations that includes the following variables: oil prices, the RUB/USD exchange rate, exports, imports. The paper used quarterly data from 1995-2009 to perform the regression analysis. Besides, the author described possible scenarios of reactions of the leading indicators of the Russian economy in response to sudden changes in oil prices. The results of the analysis showed that the dynamics of the Ruble exchange rate depends on oil prices. Similar conclusions were drawn based on the Granger causality test. The author also discovered that capital inflows into the economy also have an essential effect on the Ruble exchange rate fluctuations.

No less impressive is the work (Al-mulali, Che Sab, 2012), which also aimed to study the impact of oil prices on exchange rates. The study used data for almost the same period (2000-2010), considering the countries that are members of OPEC. In their work, the authors built the Random effect model, which consisted of 5 explanatory variables. Their study findings showed that the currencies of oil-exporting countries are highly dependent on oil prices. Besides, other explanatory

variables, such as inflation, public procurement, and balance of payments, were also significant.

The authors in Mohammadi et al. (2012) analyze the relationships (long-term and short-term) between real oil prices and the actual exchange rates in 13 oil-exporting countries. The study selected monthly data for the period 1970 to 2010. The authors built an econometric model TAR, the results of which showed the existence of a dependence of national currencies on oil prices in the long run only for three countries out of 13 - Bolivia, Mexico, Norway This reliance was trivial for the remainder of the nations, as many of them were able to keep a stable state's balance of payments. The authors also concluded that countries with floating exchange rates are more susceptible to oil price fluctuations.

Emerging economies quite often suffer from resource export dependency. In this paper (Turhan et al., 2013), the authors examine how oil prices affect the exchange rates of national currencies of developing countries against the dollar. This paper reviews 13 developing countries, including Russia, using a sample of daily data from 2003 to 2010, which the authors divided into three periods to consider the impact of the crisis. A study based on econometric models (VAR and Wald) showed that the dependence of the currencies of developing countries on oil price fluctuations increased after the crisis.

In the article (Ebaidalla, 2014), in contrast to previous works, the author conducts his research based on data from only one country - Sudan. The paper examines the period from 1999 to 2009, during which Sudan significantly increased its oil exports. The author conducts several tests to determine how oil prices affect the macroeconomic performance of the country. The findings of these tests have been reported in the Var model, which was transformed into the Moving average form. The outcomes of these tests demonstrated that during the period under review, Sudan's national currency was dependent on oil prices.

Of interest is the review (Kudrin, 2014), which describes how oil and gas exports affect Russia's monetary policy. The Central Bank must maintain the

stability of the Ruble exchange rate and low inflation, which is quite a challenge when prices in commodity markets change. The Russian economy is being poured into by the huge funds coming from oil exports. Revenues from the sale of energy resources abroad have a significant impact on the balance of payments and, accordingly, on the exchange rate of the national currency. The paper describes several strategies that the Central Bank of Russia uses to maintain the stability of the Ruble exchange rate, one of which includes currency interventions in the market. At the same time, the author describes that over the period from 2000 to 2012, Russia has faced a sharp increase in the balance of payments due to rising oil and gas prices. To mitigate the negative consequences of the Central Bank of Russia increased its gold and foreign exchange reserves by intervening in the foreign exchange market and conducted a mitigating monetary policy. The measures taken by the Central Bank contributed to maintaining a low level of inflation and stability of the Ruble exchange rate over the period under review.

The most exciting work is the article (Dreger et al., 2015), which explores the current currency crisis in Russia. The authors consider how the fall in oil prices and anti-Russian sanctions have affected the Ruble exchange rate. In this paper, the Cointegrated VAR model was used to analyze the correlation between the Ruble exchange rate and oil prices, the interbank rate of RUONIA, and the composite sanctions index developed by the authors. The study results show that the main reason for the fall in the Ruble value is the fall in oil prices, while unforeseen sanctions had an impact on the level of conditional volatility of the variables.

The analytical article of the Shibanov and Shcherbakova (Shibanov and Shcherbakova, 2015) presents exciting facts. This article's writers claim that the dependence of the Ruble exchange rate on oil prices has significantly decreased by the end of 2015. The article describes the main factors that influenced the supply and demand in the foreign exchange market and contributed to reducing the impact of oil prices on the Ruble exchange rate. By the end of 2015, the need

for foreign currency decreased because the real money supply shrank in the economy (the value of the money supply increased by 8.6% from November 2014 to November 2015, and inflation amounted to 15%). The shrinkage of the money supply occurred due to the restriction of the Central Bank on the provision of repo transactions and loans secured by collateral. Furthermore, the reduction in the number of foreign debt payments and the decline in imports also affected the foreign exchange market demand. As a result, the factors that arose under the influence of the Central Bank and natural causes provoked a lack of excessive demand and enough supply in the foreign exchange market and led to a decrease in fluctuations in the Ruble exchange rate due to movements in oil prices.

2.The analysis of the Russian oil and gas sector

The Russian economy, and the oil and gas sector, in particular, has changed dramatically in the last five years due to the impact of sanctions and sharp drops in oil prices, so the author decided to analyze the Russian oil and gas sector in this chapter. Moreover, this chapter reveals the dynamics of the ruble devaluation and oil prices, as well as considers the leading Russian oil companies. The author used data and information for the analysis from the Russian state statistics site, the site of the Central Bank of Russia, official websites of the Russia oil companies, and the annual publications of the Gaidar Institute.

2.1.1 Oil Price Collapse

Besides the imposed sanctions, the oil companies of Russia, as well as the world oil market, faced a significant price collapse started in the fourth quarter of 2014. The price of Brent oil dropped from $108.8 per barrel in January of 2014 to $52.4 per barrel in December 2015, while the cost of Ural oil dropped from $107.7 per barrel to $51.2 per barrel in the same period (Table 1). The main reason for such a decline in prices is a significant excess of world oil supply over demand- the US increased shale oil production. Furthermore, OPEC countries refused to reduce the established oil production quota to retain a share in the world oil market. Subsequently, the price of Brent oil and Ural oil reached $44 per barrel and $41.9 per barrel in December 2016, respectively (the Ural oil price reached its minimum equals to $28.8 per barrel in January 2016).

Table 1. World oil prices in 2013-2018 ($ per bbl.).

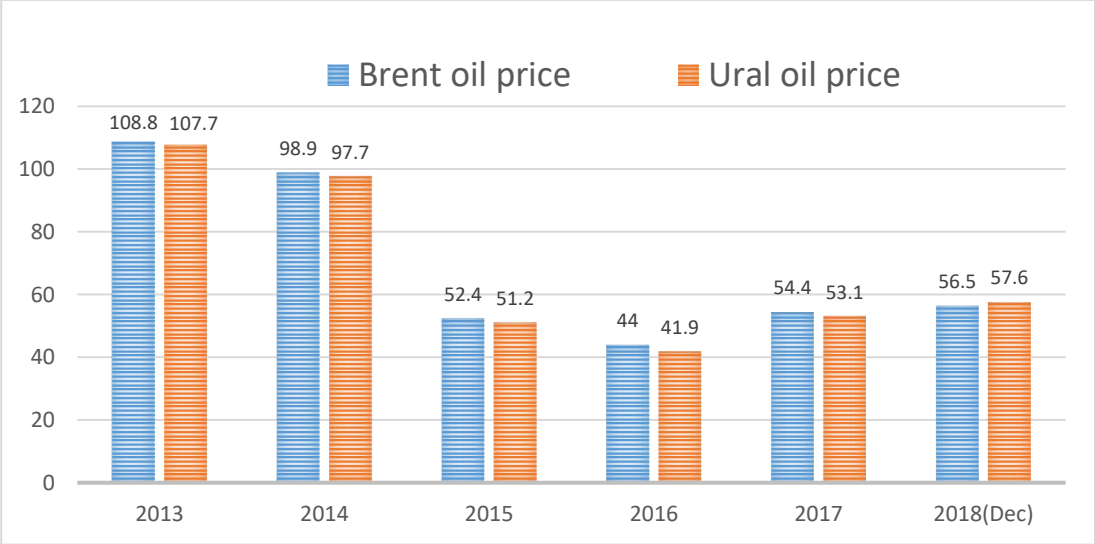
	2013	2014	2015	2016	2017	2018
Brent oil price	108.8	98.9	52.4	44.0	54.4	56.5
Ural oil price	107.7	97.7	51.2	41.9	53.1	57.6

Source: Gaidar Institute Publishers (2019). Russian Economy in 2018.

Afterward, under the influence of low oil prices, the United States reduced the production of shale oil from high-cost fields. Besides, in December 2016, the OPEC countries and some oil and gas producing countries agreed to cut oil

production. As a result, the price of oil grew to $54.4 per barrel (Brent oil) and $53.1 (Ural oil) in December 2017. This agreement was further extended several times and at the summit of oil and gas producing countries in December 2018 was decided to reduce production by 1.2 million barrels per day (till the end of June 2019) from the level of October 2018. Because of a significant reduction in oil production, there was an increase in the price of Brent oil ($85 per barrel) in October 2018. However, the oil prices started to fall from November 2018 and reached $56.5 per barrel (Brent oil) and $57.6 per barrel (Ural oil) in December 2018 (Figure 1). There were several reasons of falling oil prices at the end of 2018: 1) the IMF lowered its global GDP growth forecast, and after this, analysts started talking about the fact that a slowdown in economic growth will reduce the demand for oil. One of the main factors of slowdown in global economic growth was the trade war between the USA and China, 2) weak US sanctions against Iran that caused an oversupply of oil on the world market, 3) Russia for a long time did not agree to reduce the country's oil production by 300 thousand barrels per day due to cold weather.

Figure 1. Oil Price Dynamics from 2013 to 2018, USD per barrel.



Source: compiled by author based on data Gaidar Institute Publishers (2019). Russian Economy in 2018.

In the first half of 2019, the price of oil began to rise, and on May 2019, the cost of Brent reached $66.1 and the cost of Urals oil reached $70.93, but in the

second half of 2019, oil prices began to fall and in August 2019, oil prices were below $60.

Russia's economy relies heavily on oil manufacturing and exports. In 2018, the government revenues from oil and gas exports exceeded $ 150 billion (45.6% of the total income of the Russian budget during this period). The collapse of oil prices has severely affected not only the oil and gas sector but all other areas of the economy as well.

2.1.2 Influence of OPEC Agreements on Oil Price

For stabilizing the oil market, oil-producing countries established an international intergovernmental organization of oil-exporting countries, OPEC. The organization's activities are aimed at coordination of activities and development of the general policy concerning oil production among the member countries of the organization to stabilize oil prices and stabilize oil supplies to consumers. The primary mechanism of the cartel's influence on the oil market, which has been in force since 1982, is the decision making the process to change the level of crude oil production. The OPEC is undoubtedly one of the most important events contributing to the development and cooperation of international and intergovernmental organizations. OPEC has a significant impact on price setting, production levels, and capacity utilization. The economic policy of OPEC countries not only has a substantial effect on the international financial system but also depends directly on the pace of its development. At the same time, based on experts' forecasts, the growth of energy resources consumption will not decrease, but will, on the contrary, grow, which will serve as a reason for further strengthening the influence of OPEC countries in the world arena.

The crisis in 2014, caused by a sharp drop in oil prices, is already the fourth case in the last thirty years, but the uniqueness is that for the first time OPEC has not acted to reduce production. The continued fall in oil prices has led producing countries to reduce their oil production significantly. At the end of 2016, the

OPEC countries and several other oil-producing countries ("OPEC+") reached an agreement to reduce oil production (1.8 mb/d) by six months starting from 1 January 2017. At the end of May 2017, the OPEC+ countries decided to reduce the excess oil supply further and extended the agreement to cut production by nine months, and at the end of November 2017, the agreement was extended until the end of 2018. The implementation of OPEC+ agreements led to a reduction in oversupply and a marked increase in world prices. Thus, the cost of Brent increased from $44/bbl in 2016 to $54.4/bbl in 2017 and $71.1/bbl on average in 2018.

Oil prices significantly declined at the end of 2018, and on 7 December 2018, under these circumstances, OPEC+ nations chose to decrease oil output by 1.2 million barrels per day from the point of October 2018 starting in early 2019. This arrangement is expected to be in force until the end of June 2019, and in April 2019 it gives for modifications. According to the contract, OPEC nations are to cut output by 800,000 barrels a day, and countries outside the organization-by 400,000 barrels a day, including Russia-by 228,000 barrels a day (2%). On 1 July 2019, at a meeting in Vienna, The OPEC nations agreed to extend the nine-month reduction contract on oil manufacturing.

The OPEC+ production limitation agreement has a positive impact on the price, but not significantly. Even though the price has increased compared to 2015-2016, it remains below the annual budget level, which means that the treasury receives less revenue. To cover the deficit, Russia is spending a reserve fund, which was previously replenished with super revenues from oil exports, but this fund is not infinite. Moreover, in the long run, the collapse of prices and the imposition of sanctions will have a detrimental effect on oil and gas companies.

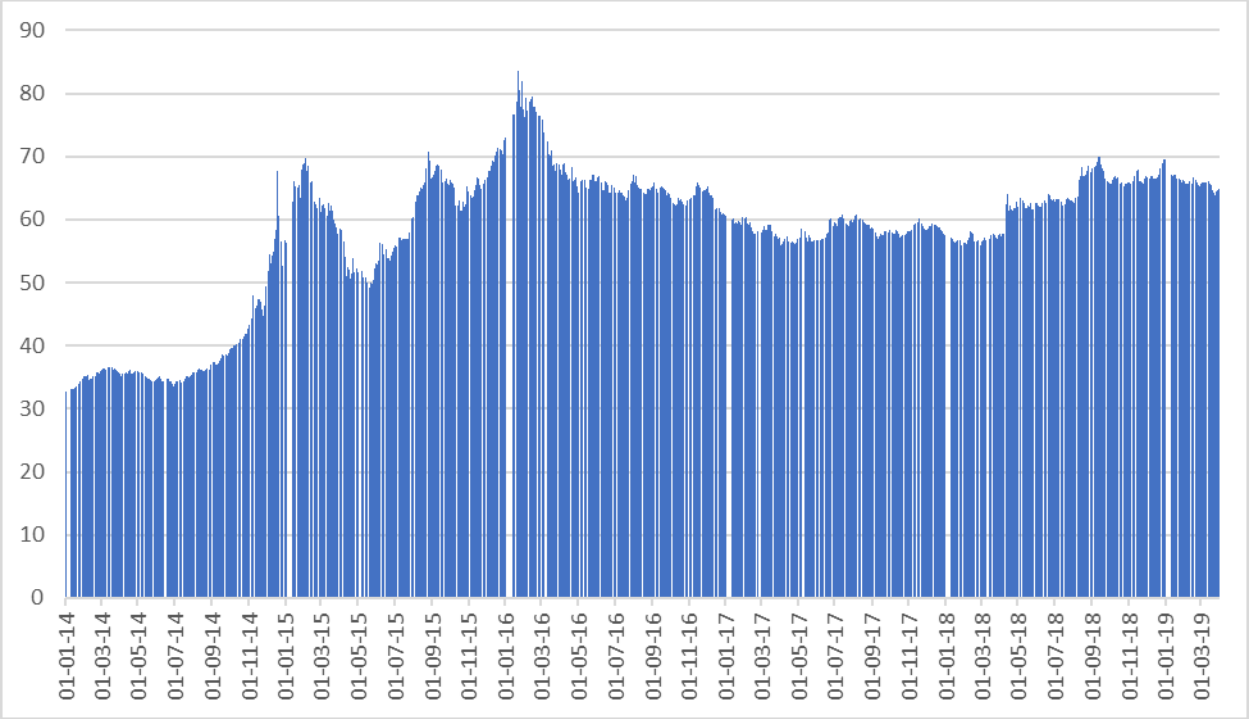
2.1.3 Ruble devaluation

The fall in world oil prices was one of the most significant reasons which provoked the ruble devaluation. In the second half of 2014, the fall in oil prices

led to the weakening of the ruble, which more than halved against other currencies, in particular, the US dollar and the euro, over 3-4 months. By the end of 2014, the RUB/USD exchange rate increased from 32 rubles to 70 rubles (Figure 4).

The second significant factor that aggravated the situation and created additional pressure on the ruble exchange rate is the deterioration of business relations between Russia and many Western countries. Many countries have imposed economic sanctions on Russian companies and dignitaries. As a result, many domestic companies faced difficulties in interacting with foreign partners and financing their debt obligations. This situation has led to an excess of demand oversupply in the foreign exchange market, which has resulted in a foreign currency shortage. This imbalance contributed to the ruble devaluation, increasing the effect of falling oil prices.

Figure 2. RUB/USD exchange rate from 01.01.2014 to 31.03.2019.



Source: Compiled by author based on data from the Russian central bank official website.

Furthermore, one of the critical factors was a speculative sentiment among exchange trading participants. The unfavorable situation in Russia turned out to be an excellent opportunity for speculators to make a profit-through their actions,

speculators significantly increased market volatility and worsened the position of the national currency of the Russian Federation, any news and rumors had a significant impact on the market and were the reason for the weakening of the ruble. Among the speculators were large export companies that did not convert their foreign exchange earnings to make extra money on exchange rate changes, while they financed their expenses with relatively cheap loans.

On 16 December 2015, the Russian ruble weakened against the US dollar by raising the base interest rate to 0.25% - 0.5%, which resulted in the US dollar value increasing from 70.4 to 73 rubles at the end of the trading day. An increase in the base rate by the US, in the long run, may provoke an inflow of funds into their economies and create additional pressure on the financial markets of developing countries, which includes Russia.

All this situation has led to the fact that the RUB/USD exchange rate at the beginning of 2016 reached the highest point - 83 rubles (Figure 4).

Russia took steps to maintain the ruble exchange rate. For example, the majority of private and public companies were under pressure to sell the proceeds from export activities in the foreign exchange market to maintain the national currency. This impact was manifested in the following events: on 20 December 2014, the President of the Russian Federation held a meeting with the heads of large Russian exporters and significant people in the business of the country. At this meeting, the President recommended the participants of the meeting to assist the state in maintaining the national currency by selling surplus foreign currency in the domestic market of the country. Further, on 23 December 2014, a directive was issued imposing restrictive limits on the foreign currency assets of the five largest exporting companies and the obligation of these companies to sell current and future foreign currency surpluses over the established deadlines.

However, the substantial ruble devaluation negatively affected the profit and profitability of the companies, which in turn influenced the share price and capitalization of the companies.

2.2.1 The Russian oil production

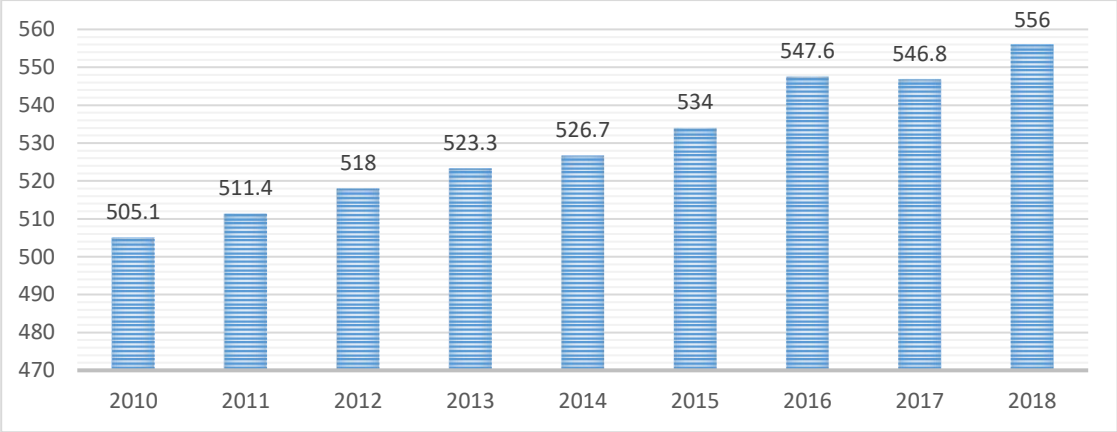
The situation in 2014-2016 has shown that the Russian economy is very dependent on oil prices because revenues from oil and gas exports account for a considerable share of the state budget. When world oil prices plummeted in 2015 (from $105-115 per barrel in the first half of 2014 to $30 per barrel at the end of 2015), the Russian economy was in a severe decline - Russia's GDP showed negative growth rates (-3.7% in 2015 and -0.8% in 2016), as well as a significant increase in the U.S. dollar compared to Russian Ruble. As the oil price fell by almost 50% from June 2014 to January 2015, Russia faced severe economic difficulties of a budgetary nature. From 2014 to 2016, the country's revenues to the state budget decreased from 7,434 billion RUB to 4,844 billion RUB, considering that oil production and exports grew significantly. During the period from 2015 to 2016, the Russian administration spent almost 60% of its disposable funds to cover the state budget deficit. According to the most optimistic estimates of the Minister of Finance of Russia, in the next three years, its total volume will be reduced to $7.9 billion. That would mean a decline of almost 90%. (Worldwide Financial Services Monitor, 2016). In addition to capital outflows, net inflows of foreign direct investment have been virtually completely frozen. Before the sanctions, the Russian economy was getting almost 75% of foreign direct investments from the EU. Due to sanctions and reduced prospects for the development of the Russian economy, the volume of FDI decreased by 30% in 2014. In 2015 the amount of foreign direct investment continued to decrease and reached 92%. Afterward, the capital shortage led to a considerable rise in interest rates. The lack of FDI, combined with high-interest rates, led to the suspension or total cancelation of many development projects (Dreyer & Popescu, 2014).

In 2016, despite the decline in oil prices and the imposition of sanctions against Russia, production levels, as well as oil and gas exports in Russia, increased. However, in 2017, following OPEC agreements, production and export

performance in Russia declined. The percentage of oil exports in Russia's total exports was 26.1% in 2017, and in the export of fuel and energy goods - 44.1%.

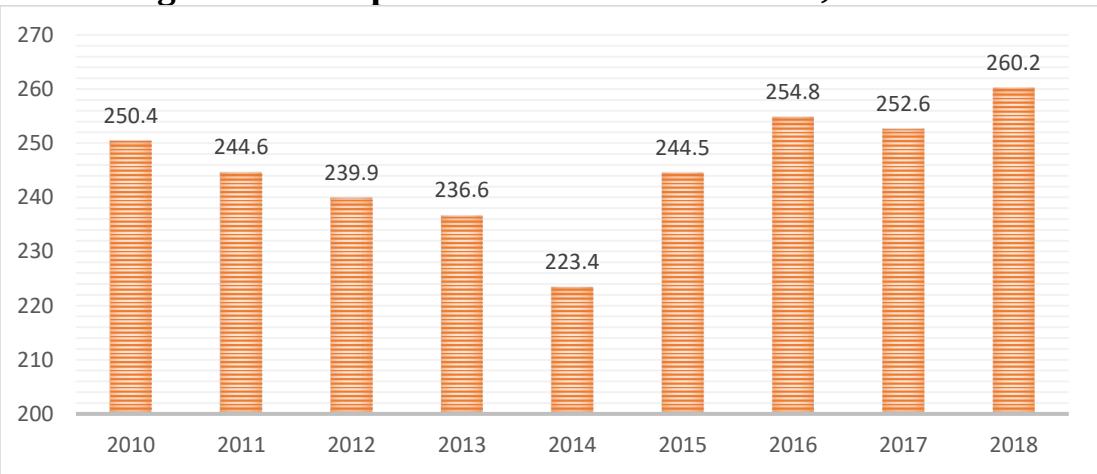
In 2018 oil production in Russia reached its post-Soviet peak (556 mn tons) (Figure 2), while export reached heights of the last eight years (260.2 mn tons) (Figure 3).

Figure 3. Production of oil in Russia from 2010 to 2018, mn tons.



Source: compiled by author based on data from Gaidar Institute Publishers (2019). Russian Economy in 2018.

Figure 4. Oil exports in Russia in 2010-2018, mn tons.



Source: compiled by author based on data form Gaidar Institute Publishers (2019). Russian Economy in 2018.

2.2.2 The Russian oil companies

According to statistics for 2018, 288 companies use licenses to produce crude oil in Russia. One hundred four of them are part of the structure of 8 vertically

integrated companies, which accounted for 84.9% of all oil production in Russia in 2018 (Table 2).

The leading Russian companies engaged in oil production are Lukoil, Rosneft, Surgutneftegaz, Gazprom, Tatneft, Slavneft, RussNeft, and Novatek. The creation of oil in 2018 was 555.84 million tons (Table 2). Rosneft is the largest oil producer, and its share in oil production has increased significantly in recent years thanks to acquisitions of other companies in this sector.

Table 2. Oil production of Russian companies in 2018.

Company	Oil production (million tons)	Share in the market %
Rosneft (including Bashneft)	213.1	38.3
Lukoil	82.1	14.8
Surgutneftegaz	60.9	11
Gazprom (including Gazpromneft)	56.9	10.2
Tatneft	29.5	5.3
Slavneft	13.8	2.5
RussNeft	7.1	1.3
Novatek	8.3	1.5
Others	84.14	15.1

Source: Gaidar Institute Publishers (2019). Russian Economy in 2018.

PJSC "ROSNEFT" (Rosneft) is the largest vertically integrated oil producer in Russia with a market capitalization of 4346 billion rubles in March 2019 (Table 3). Approximately 75% of Rosneft's assets consist of former assets of the bankrupt Yukos. The Company is on the list of Russian Companies and Strategic Organizations. Rosneft conducts oil exploration and production in all key hydrocarbon regions of Russia and also has exploration projects in Algeria, and in some CIS countries (Kazakhstan and Turkmenistan).

PJSC "LUKOIL" (Lukoil) is a vertically integrated company, the third-largest proven oil company (1%) and the sixth-largest private oil company in the world (2%) in terms of oil production. Russia's largest private company in terms of revenue with the capitalization of 4 033 billion rubles in the first quarter of 2019 (Table 3). The company operates in Russia, Europe, South-East Asia, Central Asia, and North America.

PJSC "SURGUTNEFTEGAZ" (Surgutneftegaz) is one of Russia's largest private, vertically integrated oil companies with capitalization of 1 623 rubles in March 2019. Range of companies with a considerable oil and gas reserves in Western Siberia merged and established the Surgutneftegaz. It conducts hydrocarbon prospecting, exploration, and production in three Russian oil and gas regions. The company sells petroleum products wholesale and retail, and in 2017 began to export to the Asian and South American markets.

PJSC "GAZPROM" (Gazprom) is a vertically integrated oil company with more than 50% of its shares owned by the state (capitalization). The Gazprom Group includes Gazpromneft and more than seventy subsidiaries and branches throughout Russia, the CIS countries and abroad. The company exports its products through its large retail network to more than 50 countries and sells them throughout Russia and abroad.

PJSC "TATNEFT" (Tatneft) is a vertically integrated oil holding company with a capitalization of 1 695 billion rubles in the first quarter of 2019. The company holds a license to operate 77 crude oil fields in the Republic of Tatarstan. TATNEFT sells oilfield equipment, auxiliary services, and materials related to petrochemistry, participates in insurance and banking activities.

PJSC "RUSSNEFT" (RussNeft) was organized in 2002 and is based in Moscow. The only vertically integrated company in Russia established not as a result of privatization of state assets, but as a result of the consolidation of production assets of other companies. The company develops more than 100 oil and gas fields and operates in Europe, the CIS, and the Russian Federation. It is the first Russian oil company to launch an IPO since 2006. The capitalization of the company in the first quarter of 2019 was 171.6 billion rubles.

PJSC "NOVATEK" (Novatek) is one of the largest independent producer of oil and natural gas in Russia with a capitalization of 3 853 billion rubles in the first quarter of 2019. Moreover, the company is also engaged in the exploration,

processing, and marketing of natural gas and oil. However, most of the company's revenue comes from the sale of natural gas and gas condensate.

NGK "SLAVNEFT" (Slavneft) is a Russian oil company with a capitalization of 18.7 billion rubles in March 2019. Until November 2002, the majority of the companies' shares were owned by Russia and part of the Republic of Belarus. However, in December, more than 74% of the shares were sold at auction to private individuals. 99% of the companies' shares are controlled by Rosneft and Gazprom on a parity basis.

Table 3. Capitalizations of share prices of the largest Russian oil companies.

Company	Capitalization, billion rubles			share price, rubles		
	2018	1Q 2019	changes	2018	1Q 2019	changes
Rosneft	4 584	4 346	-5%	410.1	419.5	2%
Lukoil	3 748	4 033	8%	5 378	5931	10%
Surgutneftegaz	1 264	1 623	28%	37.4	41.5	10%
Gazprom	3 634	5 504	51%	232.5	155.1	-34%
Tatneft	1 685	1 695	1%	733.3	749	2%
RussNeft	155.5	171.6	10%	583.4	598	3%
Slavneft	26.3	18.7	-29%	29.6	18	40%
Novatek	3 437	3 853	12%	1 269	1074	15%

Source: Compiled by author based on data from official sites of the companies.

Before the sanctions were imposed, Russian oil and gas companies were actively involved in the joint development of oil fields with European and American companies. However, with the introduction of sanctions, these joint projects were canceled or closed, for example, cooperation between Rosneft and the U.S. company Exxon Mobile Development was stopped, and joint projects at the Black Sea and Arctic fields were canceled. As previously indicated, the reserves of many existing fields are declining, and new fields have unfavorable geographical and geological conditions. Without the necessary equipment and capital, Russian oil and gas companies will lose much of their competitiveness and profits, which will have a detrimental effect on all sectors of the Russian economy.

3 METHODOLOGY AND DATA ANALYSIS

An analysis of the literature on the impact of sanctions on the Russian economy in general, and on the oil and gas sector, suggests that it is not possible to say with certainty how sanctions have affected the Russian oil and gas industry at this time, and whether their impact is significant in comparison to that of other factors. This part of the paper will substantiate the specification of the model used in this study to analyze the hypotheses. Statistical data used for analysis will also be described.

3.1 Justification of the model specification

The capitalization of companies in the oil and gas sector is affected by many factors, including those that are problematic to consider in the regression model. In this study, including the literature reviewed, it was decided to include in the model the most important factors that affect the capitalization of the companies, in particular, world oil prices, the quarterly volume of direct investment in the Russian economy, the type of ownership of the Russian oil companies, the exchange rate of the USD to the Ruble, the level of monthly inflation, the factor of the orientation of sanctions on a particular company in the oil and gas industry and, of course, the sanctions themselves.

According to the majority of works on the analysis of the financial crisis in Russia, the main factor affecting the Russian economy and the capitalization of companies in the oil and gas sector was oil prices. Thus, the cost of Brent oil will be included in the regression model as an explanatory variable of *BrentOil*.

Further, a variable responsible for sanctions against Russia will be included in the regression. Since sanctions are a non-quantitative parameter in themselves, it was decided to use the accumulated sanctions index - the *Sanctions* variable. A similar methodology was used in Dreger's work (Dreger et al., 2015). Each sanction was assigned a specific weight following the classification of damage to the Braterskiy sanctions (Braterskiy, 2009):

- 1, if the sanction is political or directed at individuals (officials, businesspeople);
- 2, if the sanction is aimed at freezing the assets of small organizations and/or terminating cooperation with them;
- 3, if the sanction is aimed at freezing the assets of medium and large companies of the industrial and financial sector and/or termination of cooperation with them and/or a separate sector of the economy;
- 4, if the sanction is directed at the whole economy.

The list of sanctions imposed against Russia is provided in the Appendix.

Thus, each sanction was assigned its weight, which was then multiplied by the weight of the country. The weight of the country was considered as a share of Russia's trade turnover with this country in the total trade turnover of Russia for three years before the introduction of sanctions (2011-2013) (Table 3).

As significant part sanctions were introduced in 2014 - early 2015, respectively, the primary growth of the accumulated index of sanctions demonstrates during this period. However, the impact of sanctions over the next four years must be taken into consideration, so it was decided on the days when the U.S. or the European Union announced the extension of the sanctions to assign a value of 4, as the full package of sanctions that were extended, affected the economy of Russia as a whole.

In addition, the US dollar exchange rate will be introduced into the regression as an independent variable of USD/RUB. In some of the existing studies, the USD exchange rate influenced the Russian stock market (Fedorova and Pankratov, 2010), so there is the reason to believe that the capitalization of oil and gas companies will also depend on the USD exchange rate.

Further, direct investment in the Russian economy can have a significant impact on investor sentiment so that the model will have a variable *InvDirect*, responsible for the volume of direct investment attracted to the economy (Table 4). As there are only quarterly data on the number of direct investments, for each

day of one quarter the value of direct investments will be the same, as the share prices cannot be converted to a quarterly format, because the sanctions were introduced including the middle of the quarters. Therefore, the task of studying their impact will not be fulfilled.

Table 4. Russia's trade turnover by country for 2011-2013, which imposed sanctions, mn Rubles.

	2013	2012	2011	Amount	Share
Total	198 504 372	171 266 484	149 534 462	519 305 318	
USA	10 912 317	10 242 882	9 225 385	30 380 584	0.0585
EU	84 672 528	70 607 864	62 088 728	217 369 120	0.4186
Ukraine	6 877 904	6 717 703	6 289 625	19 885 232	0.0383
Germany	12 596 650	11 000 486	9 751 666	33 348 802	0.0642
Norway	1 089 670	955 771	1 863 697	3 909 138	0.0075
Switzerland	8 317 209	7 514 737	6 862 245	22 694 191	0.0437
Albania	1 798	1314	922	4 034	0.00001
Iceland	104 314	15 922	14 836	135 072	0.0003
Montenegro	545 971	7 514 737	401 452	8 462 160	0.0163
Australia	124 883	136811	118 309	380 003	0.0007
Great Britain	11 683 731	11 000 486	10 850 773	33 534 990	0.0646
Canada	723 189	621 442	603 784	1 948 415	0.0038
Japan	1 381 922	997 963	938 190	3 318 075	0.0064
New Zealand	25 159	22 767	29 484	77 410	0.0002

Source: The Russian central bank official website: http://www.cbr.ru/statistics/

Table 5. The amount of direct investments to Russia economy from 2013 to 2019, mn Rubles.

	2013	2014	2015	2016	2017	2018	2019
I Q		11,450	2,269	64	5,280	7,791	10,206
II Q		12,083	-469	7,468	13,014	2,358	
III Q		-59	-227	4,284	8,084	-2,870	
IV Q	8,664	-1,443	5,281	20,723	2,178	1,506	

Source: The Russian central bank official website: http://www.cbr.ru/statistics/

Furthermore, the capitalization of oil and gas companies may be affected by the type of ownership. Typically, Russian state-owned companies have more support and more opportunities to benefit from the state (from internal politics, international economic and diplomatic agreements). However, as sanctions have been imposed both against the country and against the companies themselves, this may reduce the competitiveness and profitability of these companies more,

so *CompType* binary variable was introduced (value of 1 for state-owned companies). Three of the eight companies (Gazprom, Rosneft, and Tatneft) are state-owned, and the rest is in the form of private property.

Also, the capitalization of Russian companies may be affected by Inflation, which just increased significantly in the second half of 2014 - early 2015 (Table 6), therefore, it may have contributed to the growth in share prices of Russian companies. Thus, the *Inflation* variable responsible for monthly inflation rates will be introduced into the regression. Like *InvDirect*, the value of Inflation will be the same for each day of one month.

The last variable introduced into the regression model is the binary variable *ComSanc*, which is responsible for targeted sanctions against a specific company (Table 6). Rosneft, Gazprom, Novatek, Surgutneftegaz, and Lukoil were included in the U.S. or EU sanctions lists, so *ComSanc* was assigned a value of 1 for these entities and 0 for the rest of the companies.

Table 6. Monthly inflation rate in Russia from 2014 to 2019, %.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2019	1,01	0,44	0,32									
2018	0,31	0,21	0,29	0,38	0,38	0,49	0,27	0,01	0,16	0,35	0,50	0.84
2017	0,62	0,22	0,13	0,33	0,37	0,61	0,07	-0,54	-0,15	0,20	0,22	0.42
2016	0,96	0,63	0,46	0,44	0,41	0,36	0,54	0,01	0,17	0,43	0,44	0.4
2015	3,85	2,22	1,21	0,46	0,35	0,19	0,80	0,35	0,57	0,74	0,75	0.77
2014	0,59	0,70	1,02	0,90	0,90	0,62	0,49	0,24	0,65	0,82	1,28	2.62

Source: The Russian central bank official website: http://www.cbr.ru/statistics/

Technological and financial sanctions imposed on Russian oil and gas companies have a detrimental effect on the further development of the industry. Firstly, a significant part of the exploited oil and gas fields has a falling production level. These deposits need substantial investments and modern equipment. Secondly, new explored oil and gas fields have poor geological and geographic conditions. The ban on the import of necessary equipment has created several problems for companies, despite attempts to produce import-substituting material. In the long term, these issues will affect the increase in the cost and price of oil and gas, a decrease in production, competitiveness, and productivity of

companies. Most of these sanctions are relevant today as the US and the EU extend them.

Table 7. Sanctions with a direct effect on the oil and gas industry.

Date	Sanction
-11.04.2014 **-12.05.2014**	Sanctions against 'Chernomorneftegaz' imposed by the USA (11.04) and the EU (12.05)
-16.07.2014	Sanctions against 'Rosneft' and 'Novatek' by the USA.
-30.07.2014	The EU banned on investment in oil and gas extraction in Russia by. European companies are prohibited from supplying equipment for this sector, as well as the provision of financial services.
-06.08.2014	The USA banned the supply of equipment for deep oil and gas, the development of the Arctic shelf and the extraction of shale oil and gas.
-12.09.2014	The EU banned the financing of three Russian companies: 'Rosneft', 'Transneft' and 'Gazpromneft'.
-12.09.2014	The USA imposed sanctions against 'Gazprom', 'Lukoil', 'Transneft', 'Gazpromneft', 'Surgutneftegaz', 'Novatek' and 'Rosneft'.
-07.08.2015	The USA expanded sanctions on the Yuzhno-Kirinskoye oil and gas field in the Sea of Okhotsk.

Source: compiled by the author based on the website https://www.currenttime.tv/a/russia-american-european-sanctions/29449693.html

Thus, the regression model looks as follows:

$$Price_i = b_i^0 + b_i^1 BrentOil + b_i^2 Sacntions + b_i^3 InvDirect + b_i^4 CompType + b_i^5 USD/RUB + b_i^6 Inflation + b_i^7 ComSanc + \varepsilon_i \quad (1)$$

where: i is the company number.

3.2 Statistics data

Data on daily share quotes of Russian oil and gas companies were taken from *Investing.com*.

In total, the model will include eight securities - the most significant companies related to the oil and gas industry, which are traded on the Moscow Exchange. It should be noted that the MICEX Oil and Gas Index (MICEX O&G) is made up of practically the same securities. The sample of this study includes:

- Gazprom, PJSC (GAZP);
- LUKOIL, JSC (LKOH);
- NOVATEK, JSC (NVTK);
- Rosneft, PJSC (ROSN);

- Surgutneftegaz, OJSC (SNGS);
- Tatneft, JSC (TATN);
- RussNeft, JSC (RNFT);
- NGK Slavneft, JSC (JNOSP).

The above companies were priced at the close of business from the beginning of January 2014 to April 2019 (based on the statistics of direct investments, as the Central Bank of Russia does not yet provide data on the volume of direct investments in the Russian economy in the second quarter of 2019). The majority of the companies' shares were traded for 1319 days in total over the period under review; however, for some companies (Slavneft and RussNeft), the number of days was less.

Daily Brent prices were also taken from Investing.com. Since the oil prices were more than the company's share prices, it was decided not to use the oil prices on the days when the company's shares were not traded and not to fill in the average share price gaps, as they could, for example, change the expectations of investors or some economic shock, so that the value on the missed day could change dramatically.

Quarterly data on direct investments in the Russian economy was taken from the website of the Central Bank of Russia, as well as data on the daily exchange rates of the U.S. dollar. Since the data of the quotations provided by the Central Bank, as well as the data of oil prices, did not fully coincide with the data of the companies' quotations, the regression model took into account only those data of quotations, which were present in the data on share prices, and in the data on the dollar rate, and in the data on oil prices of Brent.

3.3 Empirical analysis of the impact of examining variables on the capitalization of Russian oil and gas companies.

In this chapter the preliminary analysis of the data will be carried out, the descriptive statistics of the data on the share prices of the companies under

consideration, as well as descriptive statistics of the explanatory factors will be given. Next, the correlation analysis of data and regression analysis will be carried out. After that, the obtained results will be described, and appropriate logical explanations will be selected. For the empirical analysis of the data, the programming language R and RStudio software environment were used, as R provides a broader range of tools than Stata or Gretl.

3.3.1 Preliminary analysis of data

Before the correlation and regression analysis, we will carry out a brief analysis of descriptive statistics.

Most of the shares have different dynamics, but for almost all of them, it is possible to note a decrease in the price in the beginning-middle of 2015 and an increase in the price in the 1st quarter of 2019 (the end of the period under review).

Figure 5 shows descriptive statistics on share prices of eight companies under consideration.

Figure 5. Descriptive statistics on the share prices of the companies included in analysis.

```
> d <- Aitbaev_Dissertation
> describe(d)
      vars    n    mean     sd  median trimmed    mad     min     max   range  skew kurtosis    se
GAZP     1 1319  140.92  10.80  141.24  141.06   9.67  115.35  172.11   56.76 -0.07    -0.14  0.30
JNOSP    2  953   19.87   6.97   17.20   18.73   4.74   12.00   42.00   30.00  1.21     0.48  0.23
RNFT     3  593  571.62  27.51  569.20  574.13  29.36  472.20  629.50  157.30 -0.62     0.06  1.13
NVTK     4 1319  658.85 209.83  637.80  637.85 155.97  310.50 1200.00  889.50  0.80     0.19  5.78
LKOH     5 1319 3084.29 959.08 2849.00 2967.08 733.89 1817.20 5909.00 4091.80  1.01     0.20 26.41
ROSN     6 1319  309.82  68.99  311.55  304.81  92.01  193.20  512.00  318.80  0.49    -0.69  1.90
SNGS     7 1319   29.96   3.63   29.03   29.64   3.33   23.52   40.65   17.13  0.76    -0.24  0.10
TATN     8 1319  262.02 140.84  195.00  244.12  87.13  112.76  589.90  477.14  0.97    -0.53  3.88
```

Source: calculated by the author in RStudio.

As can be noticed in the table, most companies have the same number of observations - 1319. However, two out of eight companies have fewer observations than the others: Slavneft shares were traded for 953 days during the period under review, and for RussNeft the refinery has 593 observations. Absence of trades maybe since there are no counter bids on the exchange, which is not uncommon in the emerging stock markets. It was decided not to fill in the missed days with the last or average price, as the expectations or sentiments of investors

may change during this period, and the share price will also change. Thus, the data panel is unbalanced, but it does not prevent the regression analysis.

It can also be detected from the table that the average and median prices for all companies are close to each other; that is, the sample is distributed rather symmetrically, a significant deviation is observed only in Tatneft.

Figure 6. Descriptive statistics on explanatory variables.

```
> describe(Aitbaev_Dissertation_parametrs)
          vars    n    mean      sd  median trimmed     mad      min      max    range  skew
BrentOil     1 9460   63.87   19.84   58.12   61.41   14.31    27.88   115.06    87.18  1.01
USD/RUB      2 9460   58.13   10.87   61.07   59.34    6.69    32.66    83.59    50.93 -1.01
ComSanc      3 9460    0.70    0.46    1.00    0.75    0.00     0.00     1.00     1.00 -0.86
Inflation    4 9460    0.57    0.61    0.44    0.49    0.30    -0.54     3.85     4.39  2.95
InvDirect    5 9460 5093.20 5797.75 4283.85 4546.29 6256.46 -2870.04 20723.30 23593.34  0.88
CompType     6 9460    0.28    0.45    0.00    0.22    0.00     0.00     1.00     1.00  0.99
Sanctions    7 9460   15.42    6.61   16.78   16.21    7.26     0.00    23.16    23.16 -0.77
          kurtosis    se
BrentOil      0.30  0.20
USD/RUB       0.24  0.11
ComSanc      -1.26  0.00
Inflation    12.02  0.01
InvDirect     0.34 59.61
CompType     -1.03  0.00
Sanctions    -0.27  0.07
```

Source: calculated by the author in RStudio.

Figure 6 presents descriptive statistics on parameters. Obviously, almost all variables are forcefully displaced as they explain the panel data, that is the median of a parameter is biased. All variables have 9460 observations - the total number of considered share quotes. For these descriptive statistics, we can note that the average price of oil BRENT 63.87 dollars per barrel, which is quite low compared to the pre-crisis period, and the average dollar rate of USD - 58.13, on the contrary, is quite high relative to the beginning of 2014.

Considering the not very high monthly average value of the inflation variable, *Inflation* has a rather high standard deviation, which indicates a high level of volatility of this variable.

As for the *ComSanc* and *CompType* binary variables, they have a value of 1 (sanctions are directed at a specific company and controlling stake owned by the Russian state, respectively). Concerning *CompType* variable, The Russian state controls three companies out of eight, and in terms of *ComSanc* variable, sanctions

are directed to five companies out of eight – 62.5% of companies and for 70% of the sample values.

3.3.2 Correlation analysis.

In this part, we will do a correlation analysis of the data. Figure 7 shows the correlation matrix. From the matrix, *BrentOil* oil prices have a strong negative correlation with the accumulated *Sanctions* index, and the correlation is almost equal to -0.8 with the dollar rate. This fact is quite logical because the sanctions were introduced just at the time when the oil fell significantly in price, that is, the main jumps in the accumulated sanctions index occurred simultaneously with the harmful drops in the oil price. Also, the Russian economy has found itself in a severe crisis because of the reduced oil prices, which, in turn, led to the weakening of the Ruble and the growth of the dollar.

Figure 7. Correlation Matrix.

```
> cor(Aitbaev_Dissertation_parametrs)
              BrentOil      USD/RUB      ComSanc    Inflation    InvDirect     CompType    Sanctions
BrentOil   1.000000000 -0.798320126 -0.005439864  0.019490172  0.062608138 -0.002229588 -0.497786063
USD/RUB   -0.798320126  1.000000000 -0.004826506 -0.046948686 -0.157032301 -0.001978196  0.714417434
ComSanc   -0.005439864 -0.004826506  1.000000000  0.003253122  0.006654484  0.409860864  0.010812941
Inflation  0.019490172 -0.046948686  0.003253122  1.000000000 -0.119510677  0.001333327 -0.404675994
InvDirect  0.062608138 -0.157032301  0.006654484 -0.119510677  1.000000000  0.002727413 -0.065464584
CompType  -0.002229588 -0.001978196  0.409860864  0.001333327  0.002727413  1.000000000  0.004431801
Sanctions -0.497786063  0.714417434  0.010812941 -0.404675994 -0.065464584  0.004431801  1.000000000
```

Source: calculated by the author in RStudio.

However, such a strong correlation indicates the presence of multicollinearity in the regression model. Multicollinearity can be eliminated in several ways: by excluding any variables from the regression or by the method of principal components. The first option is obviously not appropriate, as the accumulated sanctions index is a crucial variable in the regression, and oil prices are potentially the main reason for changes in share prices in the sample. The primary component method makes it very difficult to interpret the coefficients, so in this case, this is not the right solution either. Therefore, it was decided to leave multicollinearity, as it affects the significance of the regression, and the estimates of coefficients remain unbiased.

3.3.3 Regression analysis.

To avoid distortion of results in regression analysis, it was decided to log the variables because they have a different distribution, except for binary variables (Figure 8).

Figure 8. Logarithm of variables.

```
> log(Aitbaev_Dissertation_parametrs)
# A tibble: 9,460 x 6
   Brentoil `USD/RUB`   CPI InvDirect Price Sanctions
      <dbl>     <dbl> <dbl>     <dbl> <dbl>     <dbl>
 1     4.71      3.49 0.464      9.35  4.91      -Inf
 2     4.68      3.50 0.464      9.35  4.92      -Inf
 3     4.67      3.50 0.464      9.35  4.93      -Inf
 4     4.67      3.50 0.464      9.35  4.94      -Inf
 5     4.68      3.50 0.464      9.35  4.94      -Inf
 6     4.67      3.51 0.464      9.35  4.92      -Inf
 7     4.67      3.51 0.464      9.35  4.92      -Inf
 8     4.68      3.51 0.464      9.35  4.92      -Inf
 9     4.67      3.52 0.464      9.35  4.92      -Inf
10     4.67      3.52 0.464      9.35  4.94      -Inf
# ... with 9,450 more rows
```

Source: calculated by the author in RStudio.

Since in the period under consideration was the outflow of investments from the country, the value of investment outflow was not considered. Moreover, in August and September 2017, the Russian economy was experiencing deflation, and therefore, this indicator was negative, so the inflation rate was transformed into CPI (*CPI* variable), to obtain a correct result:

$$CPI = 1 + Inflation\ rate(\ decimal\ fraction) \qquad (2)$$

The logarithm of the *Sanction* variable at the beginning equals to infinity, as sanctions against Russia have been introduced since March 2014.

Heteroscedasticity test

In order to check the data for heteroscedasticity, the classical version of the Breusch-Pagan test was used.

Hypothesis:

H0: $Var(\varepsilon_i) = \sigma^2\ for\ all\ i$

The test results are shown in Figure 9 below:

Figure 9. The results of the classic Breusch-Pagan test.

```
        Breusch-Pagan test

data:  Price ~ Brentoil+ `USD/RUB` + CPI + InvDirect +Sanction + ComSanc+
CompType
BP = 2594.6, df = 7, p-value < 2.2e-16
```

Source: calculated by the author in RStudio.

Since p-value tends to zero, the hypothesis that there is no heteroscedasticity is rejected. Since heteroscedasticity influences, the consistency and efficiency of estimations, the models presented below will use standard errors in the form of White.

Model testing

As mentioned above, the set of data under study is a panel data set. In general, the panel data structure is written as follows:

$$y_i = \begin{pmatrix} y_{i1} \\ \cdots \\ y_{iT} \end{pmatrix},\ X_i = \begin{pmatrix} x'_{i1} \\ \cdots \\ x'_{iT} \end{pmatrix},\ \varepsilon_i = \begin{pmatrix} \varepsilon_{i1} \\ \cdots \\ \varepsilon_{iT} \end{pmatrix} \tag{3}$$

where: -y_i is the dependent variable for the object i at the moment of time t,

-X_i- set of independent variables (dimensional vectors k),

-ε_i - the corresponding error.

In the empirical part, the number of objects (Oil companies) *i* is 8, the number of independent variables *k* is 7, and the number of moments *t* is 1319.

As for the united vectors, their form is presented below:

$$y = \begin{pmatrix} Y_1 \\ \cdots \\ Y \end{pmatrix},\ X = \begin{pmatrix} X_1 \\ \cdots \\ X_N \end{pmatrix},\ \varepsilon = \begin{pmatrix} \varepsilon_1 \\ \cdots \\ \varepsilon_N \end{pmatrix} \tag{4}$$

The following three models will be discussed:

- The Pooled Model is a combined panel data model;
- A panel data model with random effects;
- Panel data model with fixed effects.

All three models can be expressed in a form:

$$y_{it} = \alpha + x'_{it}\beta + z'_i\gamma + c_i + u_{it} \tag{5}$$

where: -z'_i is a vector that includes parameters that do not change over time,

- u_{it} and c_i are random components that mathematical expectation equals to 0.

Combined panel data model

The combined panel data model is a common linear regression model, which essentially does not consider the panel structure and is evaluated by the Least Squares Method. This model does not consider time effects, as well as individual effects of companies, c_i=0.

Figure 10. Result of the pooled panel data model.

```
Coefficients:
              Estimate  Std. Error  t-value  Pr(>|t|)
(Intercept)  0.89241349  0.57644798   1.5481  0.121639
XBrentoil    0.27256191  0.10794345   2.5250  0.011591
XUSD/RUB     0.32804790  0.24841884   1.3205  0.186698
XInvDirect  -0.00014348  0.01601656  -0.0090  0.992853
XSanction    0.10882464  0.03992098   2.7260  0.006427
XComSanc     0.51576569  0.01893620  27.2370 < 2.2e-16 ***
XCompType   -0.27339614  0.01932517 -14.1472 < 2.2e-16 ***
XCPI         0.00814305  0.06336003   0.1285  0.897741
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares:    3267.4
Residual Sum of Squares: 2929.3
R-Squared:      0.10348
Adj. R-Squared: 0.10256
F-statistic: 112.619 on 7 and 6830 DF, p-value: < 2.22e-16
```

Source: calculated by the author in RStudio.

As is shown in Figure 10, the pooled data model has a poor fit: the adjusted R-square is 0.10, which is an indicator that the parameters do not explain the dependent variable well; almost all coefficients, except for the variables *ComSanc* and *CompType* are insignificant even at 10% level. This fact may be due to the fact, mentioned above that the pooled model does not consider time effects, which are present in the model quite a lot.

Model with random effects

Now let's consider a model with random effects. This model assumes that $E(c_i|z_i, X_i) = 0$

Figure 11. The result of a model with random effects.

```
Coefficients:
              Estimate Std. Error t-value  Pr(>|t|)
(Intercept)  0.7783371  0.7237073  1.0755  0.282212
XBrentoil    0.4176325  0.1334117  3.1304  0.001756 **
XUSD/RUB     0.2597587  0.3147732  0.8252  0.409286
XInvDirect  -0.0226918  0.0206458 -1.0991  0.271781
XSanction    0.1377355  0.0517499  2.6616  0.007804 *
XComSanc     0.4999468  0.0230469 21.6925 < 2.2e-16 ***
XCompType   -0.1959614  0.0251217 -7.8005 7.546e-15 ***
XCPI        -0.0080955  0.0785408 -0.1031  0.917909 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares:    2399.2
Residual Sum of Squares: 2168.9
R-Squared:      0.596008
Adj. R-Squared: 0.59466
F-statistic: 71.2331 on 7 and 4695 DF, p-value: < 2.22e-16
```

Source: calculated by the author in RStudio.

This model obviously surpasses the pooled model in terms of fit quality. The corrected R-square has a value of 0.59, which indicates good quality of the model. Only *ComSanc* and *CompType* remained insignificant; all other coefficients are significant at a 5% significance level (Figure 11).

A model with fixed effects

In the model with fixed effects, it is assumed that $E(c_i|X_i)$ depends on X_i. Also, the model with fixed effects does not allow to estimate α and γ, so the coefficients at *ComSanc* and *CompType* variables cannot be calculated. Below is the result of the model with fixed effects.

The fixed-effect model has an adjusted R-square of 0.42. Similar to the random effect models, all variables are significant at 5% level (*ComSanc* and *CompType* variables, unlike the previous model, are absent here) (Figure 12).

Comparison of models

All three regressions are significant. However, it is obvious that the pooled model is much inferior to the other two in terms of fit quality. Let's compare all three models. First, we use the usual F-test to compare the pooled and fixed-effect models.

Figure 12. Fixed effect model results.

```
Coefficients:
               Estimate  Std. Error t-value Pr(>|t|)
(Intercept)  0.00032271  0.00015046  2.1449  0.03208
XBrentoil    0.02026910  0.01562936  1.2969  0.19482 ***
XUSD/RUB    -0.05285491  0.03148849 -1.6785  0.09339 **
XInvDirect  -0.00139171  0.00134978 -1.0311  0.30262
XSanction    0.00168252  0.00381006  0.4416  0.65882 ***
XCPI        -0.00909475  0.00709204 -1.2824  0.19985 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares:    0.10249
Residual Sum of Squares: 0.10212
R-Squared:      0.4617811
Adj. R-Squared: 0.4277837
F-statistic: 1.54606 on 5 and 2129 DF, p-value: < 2.22e-16
```

Source: calculated by the author in RStudio.

Figure 13. Comparison of pooled and fixed-effect models.

```
        F test for individual effects

data:  Price ~ Brentoil+ `USD/RUB` + CPI + InvDirect +Sanction + ComSanc+
CompType
F = 12990, df1 = 11, df2 = 12129, p-value < 2.2e-16
alternative hypothesis: significant effects
```

Source: calculated by the author in RStudio.

F-statistics is equal to 12990 at 11 and 12129 degrees of freedom, P-value tends to zero. Therefore, there are bases to reject hypothesis H0 about true "through the model." Thus, it is expected that the model with fixed effects is preferable to the pooled model (Figure 13).

Moreover, let us compare the pooled model with the model with random effects. For this purpose, we use the Breusch-Pagan test, which is the Lagrange multiplier.

Figure 14. Comparison of pooled model and random effect models.

```
        Lagrange Multiplier Test - (Breusch-Pagan) for unbalanced panels

data:  Price ~ Brentoil+ `USD/RUB` + CPI + InvDirect +Sanction + ComSanc+
CompType
chisq = 3176000, df = 1, p-value < 2.2e-16
alternative hypothesis: significant effects
```

Source: calculated by the author in RStudio.

Statistics χ^2 is equal to 3176000, and P-value tends to zero, i.e., there are reasons to reject the H0 hypothesis about the correct pooled model (the hypothesis is that c_i is equal to 0 for any i). Thus, the tests showed that the pooled model is insolvent (Figure 14).

Finally, let us compare the models with random and fixed effects. For this purpose, we will use Hausmann's test on the model specification. The H0 hypothesis assumes that the difference in the coefficients of the models is not systematic, but is random, i.e., the estimations in the model with random effects are valid and it is possible to choose this model.

Figure 15. Comparison of models with fixed and random effects.

```
        Hausman Test

data:  Price ~ Brentoil+ `USD/RUB` + CPI + InvDirect +Sanction + ComSanc+
CompType
chisq = 1.206, df = 5, p-value = 0.838
alternative hypothesis: one model is inconsistent
```

Source: calculated by the author in RStudio.

As a result of the test, P-value tends to 1, which suggests that there is no reason to reject the null hypothesis. Thus, the estimates in the random effect model are valid and this model is more preferable. It is worth noting that in practice, Hausmann's test usually gives the result in favor of the model with fixed effects (Figure 15).

3.3.4 The results of empirical analysis.

1. According to the results of the random effect model, the accumulated index of sanctions has a negative impact on the capitalization of Russian oil and gas companies, i.e., the more sanctions were introduced, and the closer Russia's trading partners introduced them, the lower was the share prices of Russian oil and gas companies. Thus, **the main hypothesis (H1)** of this dissertation is **confirmed**, and the official introduction of sanctions by the US, the EU and other trading partners of Russia had a negative impact on the shares of Russian

organizations in the oil and gas sector. There are several reasons for this effect of sanctions:

- The sanctions limited access to foreign lending to some oil and gas companies, which could also have had a negative impact on other companies (changes in investor expectations, etc.);

- Many Russian banks have been subject to similar sanctions, which may have caused problems for Russian oil and gas companies in obtaining loans in Russia;

- Direct investment in the Russian economy declined following the imposition of the sanctions, which also affected the oil and gas sector.

- As has been shown in some studies, for example (Gurvich and Prilepskiy, 2015), (Domanska and Kardas, 2016), sanctions have not so much affected the Russian economy as reduced its ability to withstand the effects of the financial crisis. This fact is also considered in the regression, as the period of the most considerable leaps in the accumulated sanctions index coincided with the period of the financial crisis in Russia.

However, it is worth noting that the capitalization of Russian companies may have been more influenced not so much by the fact that sanctions were imposed, but rather by the news of their intentions to impose them, as stock market prices are always highly dependent on the expectations and sentiments of investors, and changes in expectations are still reflected in the stock price, even if the expected event has not yet occurred. As a result, it would be inefficient to check the impact of sanctions on securities quotations using the method of event analysis, as the effect of sanctions themselves can be long-term (primarily technological sanctions), while the reaction to the expectations of sanctions was reflected in prices long before their introduction. This problem, therefore, stays open to future studies on this subject.

2. The *ComSanc* variable proved to be insignificant in a model with random effects. Thus, **the hypothesis (H2)** about the impact of sanctions on a specific company's share prices **was not confirmed**.

3. The binary variable *CompType* was also insignificant in a model with random effects, so **the hypothesis (H3)** about the impact of the ownership type of companies on capitalization **was not confirmed**.

4. Coefficients at *BrentOil* and *USD/RUB* parameters turned out to be significant at 1% and 5% significance levels, respectively. Since the coefficient is positive for the *BrentOil* variable and negative for the *USD/RUB* variable, **the last hypothesis (H4)** put forward before the empirical analysis **was confirmed**. Low oil prices worsen the condition of the Russian economy and stock market, respectively, and oil and gas companies. As stated in the review of the Russian oil sector, as a result of the decline in oil prices, companies had to reduce costs and investments significantly.

5. The ratio for direct investments turned out to be insignificant. This may be because the market does not immediately react to the level of direct investments in the economy, for example, the information on the level of investments does not come to the market immediately but after a certain period.

6. Finally, the coefficient with the variable responsible for the level of monthly inflation is also significant at 1%, and the coefficient is negative. Thus, the assumption that share prices of Russian companies are becoming more expensive due to inflation has not been confirmed. This could be described by the assumption that periods of high monthly inflation coincided roughly with periods of sharp declines in oil prices and the dollar exchange rate, so high monthly inflation worsened the economic situation in the country (for example, in January 2015, monthly inflation was 3.85%, which, in a right way, is the annual inflation rate).

7. When comparing models with fixed and random effects, the choice was made in favor of the second one, which is not so common in the studies. This suggests that special effects are not systematic, i.e., the Russian oil sector is "homogeneous." This may be due to the high degree of government involvement in the affairs of oil and gas companies.

3.4 Discussion

In this part, the author will discuss and compare the results of the empirical analysis with the results of research papers related to the topic of this dissertation.

There are several papers where economists tried to analyze the impact of sanctions on Russian oil and gas companies, but these works are mainly qualitative, descriptive. However, a notable exception is the study conducted by Lipatnikov and Kirsanova (2018) where, based on econometric analysis, it was shown that the impact of sanctions on the cost of Russian of oil and gas companies. In this paper, the authors analyzed the capitalization of Russian oil and gas companies based on data from 2012 to 2016. The analysis was done for the oil and gas industry separately (oil companies: Lukoil, Rosneft, Tatneft, Gazpromneft; gas companies: Gazprom, Novatek, Rosneft). For analysis of oil and gas companies, the following variables were used: *Oil_capitalization/Gas_Capitalization* (Total market capitalization of selected oil/gas companies in dollars - dependent variable), *Oil_price/Gas_Price* (average quarterly oil/gas price in dollars), *Sanctions* (the existence of sanctions imposed on Russian oil/gas companies), *Oil_production/Gas_Production* (the total quarterly production of oil/gas and liquid hydrocarbons by the companies in millions of barrel/ in billions of cubic meters), *Oil_reserves/Gas_Reseves* (total proved, probable and possible SPE-PRMS oil/gas reserves by companies in millions of barrels/ in billions of cubic meters), *Netdebt/EBITDA* (a debt load indicator that measures the ability to repay existing liabilities), *Netincome/Revenue* (return on sales). As in this dissertation, the authors have logarithmized the variables for the convenience of interpretation in basic regressions. Moreover, the authors found a strong correlation between capitalization and oil price. However, as in this dissertation, the authors decided not to exclude this variable (Oil_price) because it plays an essential role in the regression analysis. The authors (Lipatnikov and Kirsanova) further presented regression models for oil and gas companies. In terms of oil companies, Variable

Sanctions, *Netdebt/EBITDA*, and *Netincome/Revenue* turned out to be insignificant, as their p-value significantly exceeds the accepted level of importance. With regard to gas companies, the variables *Gas_Price*, *Sanctions*, *Gas_Production*, and *Netincome/Revenue* were insignificant.

Comparing the results of the Lipatnikov and Kirsanova article and the results of this dissertation, it can be made the following conclusions:

1) This dissertation did not analyze the capitalization of gas companies as they did not face much direct harmful effect from sanctions. Moreover, the price of natural gas is stable regardless of the current macroeconomic and international political situation and is not a factor in the value of companies.

2) In both cases, the price of oil has a positive impact on the capitalization of companies;

3) Furthermore, the Sanctions variable in the authors' work was not significant, while the impact of sanctions on capitalization was proved in the dissertation. The difference in methodology can explain the difference in conclusions regarding sanctions. For example, the method of accumulation index of sanctions was applied in the thesis, while in the analytical paper Sanctions were considered only as a binary value;

4) Also, in the economic paper were considered the variables that were not included in this dissertation, such as *Oil_reserves*, *Netdebt/EBITDA*, *Netincome/Revenue*, *Oil_production*. The author's regression analysis has shown the insignificance of all variables except *Oil_reserves*.

5) On the other hand, the dissertation examined such a vital variable as Ruble USD exchange rate that was not included in Lipatnikov and Kirsanova work. The exchange rate of local currency to USD plays a crucial role in calculating of capitalizations of the companies.

To conclude with comparing article and thesis, both analyze showed that oil price has a direct impact on capitalization of oil companies and also the author

thinks that it may have been necessary to include a variable reserve, as this variable plays an important role in the price of oil companies shares.

There is also one significant analytical paper of Ladislav Tyll, Karel Pernica, and Marketa Arltova (2018) that calculates the impact of sanctions on the Russian economy and the Ruble USD exchange rate. In this article, Ladislav Tyll, Karel Pernica, and Markéta Arltova analyzed the relationship between Ruble USD exchange rate and the price of Brent oil to understand the impact of sanctions on the Russian economy and exchange rate. The authors used the daily time series for the data during the period from 2013 to 2016, dividing the analysis into the two-part- before sanctions and after sanctions. After creating regression model authors approved that before sanctions, there were no long-term relationships between oil price and exchange rate. In the regression model that considered data after imposing sanctions showed that there is a direct negative relationship between USD/RUB exchange rate and Brent oil price (-0.58). Moreover, the authors tried to analyze other periods, but they found that there were no shifts in rate. The comparison of the article with the dissertation showed that:

1) Both analyses approved that there is a negative relationship of the exchange rate and sanctions to other to the dependent variable;
2) Besides, the authors of the article analyzed the relationships of variables in different periods, including before sanctions, after anti-Russian sanctions, and Russian countersanctions time.

The comparison of the article of Ladislav Tyll, Karel Pernica, and Marketa Arltova (2018) with the thesis showed that there is a need to analyze the capitalization of companies before the imposition of sanctions, which would help to clarify this issue further (For example, in this article, authors showed that the relationship between the Brent oil price and the Ruble USD exchange rate has turned to be significant after imposing sanctions, and now the exchange rate reacts immediately on any oil price changes).

CONCLUSION

This paper examined the impact of the introduction and extension of anti-Russian sanctions caused by the conflict in Ukraine in 2013-2014 on the capitalization of Russian companies in the oil and gas industry. The tasks specified at the beginning of the study were fulfilled, and the objective of this study was achieved. A brief analysis of the oil and gas sector, as well as a review of the literature on the impact of political and economic factors on the stock markets of different countries and the impact of the 2014 sanctions on the Russian economy and stock market, allowed us to identify the "strengths and weaknesses" of Russian oil and gas companies, to understand what factors may affect the quotes of their securities, as well as to select a suitable methodology to take into account the introduction of sanctions by different countries. Not only the moments when various countries-imposed sanctions on Russia were considered but also further measures concerning the Russian economy.

An analysis of the literature has shown that Russian oil and gas companies are dependent on oil prices and direct investment in the Russian economy. In addition to these variables, a few more variables were added to the regression model based on the studies.

Also, based on a review of existing articles on this topic, a methodology for considering sanctions was chosen: each imposed sanction was assigned a different coefficient depending on the degree of its potential damage to the economy. The coefficient was then multiplied by the weight of the country that imposed the sanction. The weight was calculated as the share of Russia's trade turnover with the country in the total trade turnover of Russia during the three years preceding the sanctions. The methodology was improved - the number of coefficients was expanded, which allowed achieving more flexibility in the accounting of sanctions, and each extension of sanctions for an extended period (6-12 months) was assigned a maximum coefficient. Further, the coefficients multiplied by the weight of the country were added, resulting in an accumulated sanctions index.

For the analysis, eight securities were taken, which were traded for 593-1319 days, depending on the company. Values of the variables were processed in such a way that they could be considered in the context of daily quotations of shares. Thus, panel data were obtained.

At the beginning of the empirical analysis, a brief analysis of the dynamics of share prices by companies was made, as well as descriptive statistics of share prices and variables. After that, a short correlation analysis was made. During the work with panel data, three models were taken, which allow analyzing data with such structure. The R programming language was used to build regression models. As a result, the pooled model was not suitable for the analysis of available data, and the choice between the models with fixed and random effects was made in favor of the latter.

Most of the coefficients are significant, except for the binary variables, which are responsible for the targeting of sanctions on a company and type of ownership, as well as the volume of quarterly direct investment in the Russian economy. The main hypothesis of the survey was confirmed: the accumulated index of sanctions influenced the share prices of Russian oil and gas companies. An impressive result was obtained about the impact of inflation - the coefficient, as expected, turned out to be significant, but its focus was opposite to that expected before the regression analysis.

Further, there was a comparison of the results of the empirical part with the results of economic articles. Comparing the results, the author of the thesis emphasized the similarities and differences in approaches to calculation and the potential for further better disclosure of the issue of this dissertation.

To sum up, all tasks set by the author have been achieved. These tasks helped to test all hypotheses- H1 and H4 were confirmed, while H2 and H3 were not confirmed.

A severe constraint to this study is the number of oil and gas companies listed on the Moscow Exchange, as sanctions could affect smaller companies that were not represented in the sample.

In conclusion, the author would like to note that despite all the studies conducted on this topic, there is still room for study: firstly, an increase in the number of explanatory variables (both macro- and microeconomic), and secondly, a new methodology for recording sanctions or direct investments. Also, the impact of retaliatory sanctions by Russia on companies' shares should be considered in further research. Moreover, as repeatedly noted in the paper, sanctions against the Russian oil and gas industry, in particular, technological sanctions (a ban on the export of drilling technology to Russia) may have a long-term effect, i.e., they may have an impact within the next 3-10 years, unless the countries manage to establish diplomatic relations and anti-Russian sanctions are lifted during this period.

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APPENDIX

Date	Country	Content of the sanction	Coef.
04.03.14	USA	Blocking of assets and entry bans to an undetermined circle of persons	1
17.03.14	EU	Blocking of assets and entry bans for individuals	1
17.03.14	USA	Blocking of assets and entry bans for individuals	1
17.03.14	New Zealand	Blocking of assets and entry bans for individuals	1
17.03.14	Japan	Cancellation of joint investment projects, military cooperation	3
17.03.14	Canada	Blocking of assets and entry bans for individuals	1
17.03.14	Australia	Blocking of assets and entry bans for individuals	1
19.03.14	Germany	Termination of a military contract	1
20.03.14	USA	Blocking of assets and entry bans for individuals and blocking the assets of Bank Russia	2
21.03.14	EU	Blocking of assets and entry bans for individuals	1
21.03.14	Germany	Stopping the export of defense products	1
21.03.14	Canada	Blocking of assets and entry bans for individuals	1
28.03.14	Canada	Blocking of assets and entry bans for individuals and blocking company assets	2
11.04.14	Albania	Blocking of assets and entry bans for individuals	1
11.04.14	Island	Blocking of assets and entry bans for individuals	1
11.04.14	Montenegro	Blocking of assets and entry bans for individuals	1
11.04.14	Ukraine	Blocking of assets and entry bans for individuals	1
11.04.14	Norway	Blocking of assets and entry bans for individuals	1
11.04.14	USA	Blocking of assets and entry bans for individuals and blocking company assets	2
24.04.14	Germany	Stopping the export of defense products	1
28.04.14	EU	Blocking of assets and entry bans for individuals and blocking company assets	2
28.04.14	Canada	Blocking of assets and entry bans for individuals	1
28.04.14	USA	Blocking of assets and entry bans for individuals and blocking company assets	2
04.05.14	Canada	blocking company assets	2
07.05.14	USA	Restrictions on imports of goods and services	2
12.05.14	EU	Blocking of assets and entry bans for individuals, imposing sanctions against Russian companies, restricting economic cooperation	3

21.05.14	Australia	Blocking of assets and entry bans for individuals and blocking company assets	2
21.06.14	Canada	Blocking of assets and entry bans for individuals and blocking company assets	2
13.07.14	UK	Ban on the purchase of British aircraft products	1
25.07.14	EU	Blocking of assets and entry bans for individuals and blocking company assets	2
29.07.14	EU	Blocking of assets and entry bans for individuals	1
29.07.14	USA	Restrictions on access to credit, sanctions against Russian banks and a ban on technology exports to Russia	3
31.07.14	EU	Restrictions on exports of technology goods to Russia	2
31.07.14	EU	Restrictions on access to financial markets and sanctions against Russian companies	3
05.08.14	Switzerland	Blocking of assets and entry bans for individuals	1
05.08.14	Canada	Blocking of assets and entry bans for individuals and blocking company assets	3
11.08.14	Norway	Blocking of assets and entry bans for individuals and blocking company assets	2
27.08.14	Switzerland	Imposing sanctions against Russian banks and embargoes on certain goods	3
12.09.14	EU	Introduction of sanctions against various sectors of the Russian economy	3
12.09.14	USA	Introduction of sanctions against various sectors of the Russian economy	3
16.09.14	Canada	Introduction of sanctions against Russian banks and companies	3
24.09.14	Japan	Introduction of sanctions against Russian banks and companies	3
10.10.14	Norway	Introduction of sanctions against various sectors of the Russian economy	3
15.10.14	Island	Introduction of sanctions against various sectors of the Russian economy	3
04.12.14	EU	Restrictions on oil production	1
09.12.14	Japan	Blocking of assets and entry bans for individuals and blocking company assets	2
19.12.14	Canada	Blocking of assets and entry bans for individuals and blocking company assets	2

19.12.14	USA	blocking company assets	1
09.02.15	EU	Blocking of assets and entry bans for individuals and blocking company assets	2
18.02.15	Canada	Blocking of assets and entry bans for individuals and blocking company assets	2
04.03.15	USA	Extension of the sanctions package by one year	4
13.03.15	EU	Blocking of assets and entry bans for individuals and blocking company assets	2
31.03.15	Australia	Ban on investment in Crimea, restriction of exports, restriction of technology exports to Russia	3
22.06.15	EU	Extension of the sanctions package by 6 months	4
29.07.15	Island	Blocking of assets and entry bans for individuals and blocking company assets	2
29.07.15	Canada	Blocking of assets and entry bans for individuals and blocking company assets	3
22.12.15	EU	Extension of the sanctions package by 6 months	4
02.03.16	USA	Extension of the sanctions package by one year	4
22.06.16	EU	Extension of the sanctions package by 6 months	4
22.12.16	EU	Extension of the sanctions package by 6 months	4
13.01.17	USA	Extension of the sanctions package by one year	4
22.06.17	EU	Extension of the sanctions package by 6 months	4
03.08.17	USA	Blocking of assets and entry bans for individuals and blocking company assets	2
4.08.17	EU	Blocking of assets and entry bans for individuals and blocking company assets	2
31.10.17	USA	Restrictions on oil sectors. Blocking of assets and entry bans for individuals and blocking company assets	3
03.11.17	Canada	Blocking of assets and entry bans for individuals	1
26.01.18	USA	Extension of the sanctions package by one year	4
15.03.18	USA	Extension of the sanctions package by one year	4
06.04.18	USA	Blocking of assets and entry bans for individuals	1
09.05.18	USA	Blocking of assets and entry bans for individuals and blocking military company assets	3
11.06.18	USA	Blocking of assets and entry bans for individuals	1
30.07.18	EU	Blocking of assets and entry bans for individuals and blocking company assets	2
15.03.19	USA	Blocking of assets and entry bans for individuals and blocking company assets	2