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Impact of sanctions on the inflow of Foreign Direct Investment in Russian oil and gas industry

Master dissertation

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PREFACE

The dissertation “Impact of sanctions on the inflow of Foreign Direct Investment in Russian oil and gas industry” 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, Professor Nicola Coniglio, for his constructive remarks, ongoing support but also motivation throughout this master dissertation’s entire writing process.

DECLARATION OF AUTHORSHIP

I, Anjelika Han, declare that the dissertation "Impact of sanctions on the inflow of Foreign Direct Investment in Russian oil and gas industry" has been written by myself and all results presented are my own. The sources of the literature are listed in the section References.

Signature

TABLE OF CONTENTS

LIST OF TABLES, FIGURES AND MODELS

TABLES

FIGURES

MODELS

INTRODUCTION

Foreign investment is one of the essential factors in the development of the country's economy. So, a competent investment or attraction of foreign investments can have a significant impact on the development, modernization, and improvement of the technological capacity of the country's industries.

For the Russian Federation today, it is critical to turn to international sources of capital for several reasons:

- Reduction of domestic investment resources in the country due to the deterioration of the economic situation because of the unstable political and geopolitical situation in the world;
- Sanctions imposed on the Russian Federation by the EU and the USA, which have dealt a heavy blow to many industries;
- Falling oil prices and overall volatility in the oil market, as well as the tense situation in the Middle East, which also has a substantial impact on the market.

The combination of these factors makes it vital to turn to foreign sources of funding.

The relevance of studying the impact of sanctions on the inflow of foreign direct investment in the oil and gas complex of Russia is explained by the fact that, in the Russian Federation, the oil and gas sector plays a unique role in the structure of the national economy. The Russian Federation is one of the leaders in oil and gas reserves and one of the leaders in exporting these resources. The amount of money coming to the country's budget from oil and gas exports is enormous and has a considerable impact on the economic environment in the country. In this regard, the oil and gas complex has fundamental importance for the Russian Federation, but the high capital intensity of this industry and the increasingly complex conditions for extracting resources require enormous investments, so the foreign investment is a valuable source of these investments.

However, full cooperation in the field of investment on the part of the Russian Federation and Western countries is hindered by the worsened relationship in geopolitics. Since 2014, due to a series of geopolitical circumstances, sanctions have

been imposed against the Russian Federation, Western countries and their allies, which have caused severe damage to the industries of the Russian Federation.

The revision of the risk assessment of doing business in Russia has been led because of the situation in Ukraine, which is still tense, and subsequent events. Due to the imposing of economic sanctions by the EU, U.S. and other countries, as well as retaliatory sanctions imposed by the Russian government, there has been an increase in economic instability, high capital market volatility, a fall in the ruble exchange rate, a decline in foreign and domestic direct investment, and reduced access to debt financing sources. Some Russian companies, in particular, oil and gas companies, experience difficulties in gaining access to the international stock and debt capital markets.

However, the stability and viability of the Russian oil and gas complex are essential not only for the Russian Federation but also for its foreign partners. For example, Japan, which is an ally of Western countries and which has imposed sanctions on Russia, is investing vast sums of money in oil and gas projects on Sakhalin - "Sakhalin-1" and "Sakhalin-2". Japan is switching from nuclear power to liquefied natural gas. Although Japan needs to fulfill its allied duty to Western countries and impose sanctions on Russia, Japan's transition from nuclear power to liquefied natural gas is forcing Japan to invest in Russia's oil and gas projects on Sakhalin.

Therefore, the hypotheses of this study are:

Hypothesis 1. The sanctions imposed against the Russian Federation have a negative effect on the inflow of FDI to Russian oil and gas companies, as, besides general sanctions against the whole economy of Russia, the US and EU countries imposed specific sanctions on the oil and gas sector.

Hypothesis 2. The level of Russian GDP plays a considerable role in the growth of the investment attractiveness of the Russian oil and gas sector. With an increase in Russia's GDP, the flow of foreign direct investment into the Russian oil companies increases.

Hypothesis 3. Based on the literature review, was put a hypothesis about the negative impact of Brent oil price and the exchange rate have on the investment attractiveness of Russian oil and gas companies.

Hypothesis 4. As sanctions have been imposed on Russia as a whole, many foreign investors will be unwilling to invest in state-owned companies. Thus, the type of ownership affects the inflow of foreign direct investment.

This thesis aims to identify the influence of sanctions, price of oil, exchange rate, and GDP on the inflow of foreign investment in the Russian oil and gas sector.

On this basis, the following tasks are highlighted:

- Consider theories related to attracting foreign investment;
- Consider factors that affect the inflow of FDI;
- Consider sanctions imposed on the Russian Federation and their impact;
- Analyze the development of the oil and gas complex of the Russian Federation;
- Carry out empirical studies proving the hypotheses put forward by the author, which can be achieved by the following steps:
    - Collecting and description of data;
    - Justification of choosing variables;
    - Analyzing the correlation between variables;
    - Modeling panel data to estimate the impact of variables on the FDI;
    - Analysis of the results.

The master thesis consists of three chapters. The first chapter is based on the literature review and discusses theories of foreign direct investment, that can be applied to the topic. Also, in the first part, it is shown which factors may affect the inflow of FDI in the oil and gas industry. The second chapter represents sanctions that were imposed against Russian and the trend of FDI in the Russian oil and gas industry before and after imposing sanctions. The last chapter is devoted to the justification of chosen variables, analysis of data, empirical estimations, and correlation matrix. After that, it is concluded regarding the empirical part and confirmation of the hypothesizes.

1. LITERATURE REVIEW

1.1. Theories of foreign direct investment

The international capital flow is one of the main processes of globalization of the world economy. FDI is the primary source of capital for developing countries. Economic theory postulates that international capital inflows, in particular, contribute to the efficient allocation of resources, which in turn enhances economic growth. FDI can, therefore, be considered as a catalyst for technology transfer from developed to developing countries. In order to understand how the investment of the oil and gas industry is managed, theories related directly or indirectly to foreign investment are an essential part of the study. A large number of researchers have studied the nature and characteristics of the factors that influence the flow of foreign investment.

The author of this thesis considers several papers to point out that the theories that are known about direct foreign investment can be applied to the oil and gas industry in the same way as to other industries because the incentives for investment are the same.

In the 1930s, Japanese economist K. Akamatsu created a new concept of foreign direct investment, known as the "flying geese paradigm". However, it gained wider popularity in the 1960s after its author, Kaname Akamatsu, published his ideas in the Journal of Developing Economies (Akamatsu K. A., 1962). According to this theory, the product life cycle in the industry includes three main stages: import, domestic production, and export. For a weak economy, the emergence and development of a new industry begin with the fact that necessary goods are imported. In the future, when the demand for this product grows, it becomes economically pragmatic not to import this product from a developed country, but to replace it with domestic production. New production facilities are being created in the domestic market in order to meet domestic demand. At the last stage, the country begins to sell the surplus of this commodity. Akamatsu gave his theory this name because the graphical representation of the three phases of the product's life cycle resembled flying geese.

The disadvantages of this theory include the secondary role of foreign direct investment. Later on, in theory, the importance of foreign direct investment was

increased, and it was shown that foreign investment could accelerate the economic growth of the recipient country. TNCs seek to invest at a stage where they have not yet passed the stage of exporting goods to an emerging market. Transition to the third phase and export development is proceeding faster. As a result of these actions on the part of foreign transnational companies, the competitive industry in the economy of a developing country is being accelerated (Kojima K. A., 1973).

This theory considers products that do not exist in the country and which are further exported due to the import of these goods and the growth of domestic demand, so the paradigm of "flying geese" is not 100% suitable for the Russian oil and gas industry. It can be applied to new gasoline brands and other petroleum products, the refining technology of which is not yet developed in Russia.

In 1960, the theory about monopolistic advantages or the theory of market imperfection was written by American economist S. H. Hymer (Hymer S.H., 1976). The essence of this theory is that foreign investors use market imperfections in their favor. In theory, a foreign company is in a worse position than a local company because it does not have the necessary experience in the market and does not have the necessary connections. For a foreign firm, investments in other countries involve high risks and additional costs due to the remote management of branches abroad. In this case, the investment company needs to possess the advantages that exist in imperfect markets. These benefits include advanced technology, management experience, access to capital, and good organizational structure. The competent use of these monopolistic advantages will allow a foreign company to have the possibility to make foreign investments. Hymer's theory partly explains the reasons for FDI in Russia and the entry of foreign TNCs into the domestic market. Due to their comparative advantages, foreign companies can successfully operate in the Russian market.

Introduced in 1966 by the American scientist R. Vernon, the paradigm of the international goods production cycle considers the process of internationalization of the company, explains the interaction between international trade and foreign investment (Vernon R., 1966). The paradigm aimed to expand the theory of international trade described by David Ricardo, focusing on the life cycle of the product

in order to explain how the structure of trade changes over time. The theory describes the behavior of a manufacturer of a technologically advanced new product at several stages, depending on the stage of the product's life cycle. According to the theory, the creation of a new or technologically advanced product is possible in a developed economy, where the standard of living and income of the population is higher, and, consequently, the demand for such a product is higher. The final processed product, such as gasoline, can be considered as a product for our topic.

It is known that the life cycle of a commodity includes four main stages: implementation, development, maturity, and decline. The manufacturer of an innovative product tries to use advanced production as long as possible and get higher profitability covering the costs for R&D. Thus, in the process of changing the life cycle of a commodity, a producer consistently makes three types of decisions:

- to produce goods on the home market (build refineries in Russia);
- to export to foreign markets;
- to transfer production to other countries' economies (build refineries in other countries), making FDI.

By creating an innovative product (a new brand of gasoline with higher quality), the company has the opportunity to produce it at home at a lower cost, taking advantage of its monopoly position. With increasing demand and production, the product enters the second stage of the cycle. At this stage, the company has competitors in the home market, and in order to maintain its position, the producer resorted to an internationalization strategy. In the growth phase, the export of goods to foreign markets begins. The increasing competition of the next stage leads to the growth of unit costs and a decrease in profits, which leads to the search for cheaper raw materials and profitable locations of production in less developed countries.

Consequently, FDI is growing at the maturity stage when the technologies transferred are no longer advanced but standardized. This fact limits the effectiveness of investments made by transnational companies in developing economies. Thus, the Vernon concept explains the use of relatively cheap oil in Russia, but this theory cannot explain the motives of foreign TNCs entering the Russian domestic market.

Knickerbocker and Graham, in the 1970s, formulated the theory of oligopolistic protection (Knickerbocker. F., 1973). This theory argues that in oligopolistic industries, the decision of market leaders to invest abroad influences their competitors and increases their incentives to make FDI. In other words, the behavior of the leader determines the process of internationalization of his competitors.

Graham improved this model by taking the example of European TNCs and looking at their investment behavior in the US as an example. In his view, European TNCs, in their decision to invest in the United States economy, had resisted strengthening the position of American companies in Europe rather than European competitors in the United States. Thus, their goal was to fight American TNCs. As a result of the growing threat from US competitors, Europeans were strengthening their globalization strategies. In this case, the decisions on FDI could not be explained by the apparent reasons for the economic benefits, but they had a protective function aimed at deterring competition in both domestic and foreign markets. However, in highly concentrated industries (energy, metallurgy), this type of investment strategy is rare, as competition between market participants can result in lower prices and losses for all oligopolists, so leaders tend to choose the usual market division. Therefore, this theory cannot be applied to the Russian oil and gas sector.

Another point of view on explaining foreign direct investment using the concept of international trade and the exposure to foreign exchange risk they generate is based mainly on the assurances of Itagaki (1981) and Cushman (1985). This theory indicates that if there is a rise in the price of the national currency in the host country, it leads to a decrease in foreign direct investment, and vice versa. However, this theory does not consider simultaneous FDI flows between countries with different currencies (Denisia, 2010).

Michael Porter's theory of competitive advantage, written in 1990 (Porter M., 1990), which does not have any specificity for exact industries, can be applied to the oil and gas industry.

There are two approaches to the evaluation of foreign investments in the economy: microeconomic and macroeconomic. The macroeconomic approach is based

on the macroeconomic indicators of a particular country and the factors that determine the quality and volume of foreign investment. This factor includes production costs, investment climate, the stability of the national currency. Porter, in his theory, considered four main factors influencing the competitiveness of the economy. These factors include:

- factor conditions, which include proven hydrocarbon reserves and geological conditions of occurrence and profit-making;
- demand, which includes the state of the domestic market, market capacity, and market segmentation;
- strategy and structure of the companies, which includes the ownership structure and interests of shareholders;
- related industries, which include the interaction between the extractive and processing industries.

In terms of the microeconomic approach to determining the motives, investment is primarily intended to maximize the benefits to shareholders by maximizing the net profit of a multinational company. Also, large companies operating in external markets may want to access the energy resources of the host country. In the oil and gas sector, there are some peculiarities in terms of foreign capital migration:

- Resource limit;
- Correlations between investment inflows and energy prices
- Peculiarities of the countries' policies to attract foreign investment in the domestic oil and gas sector. Emerging economies are dominated by protectionist policies in the oil and gas sector, while developed countries are dominated by liberal policies in the oil and gas sector.
- Progress in advanced technologies includes the modernization of oil and gas equipment: oil pipelines, including main pipelines and oil and gas production pipelines that deliver products to consumers; gas pipelines that transport gas to consumers; refineries engaged in oil refining; natural gas liquefaction plants intended for gas storage and other oil and gas equipment.

This theory indicates that FDI in host countries was targeted at developing countries in order to turn underdeveloped and unproductive countries into developed countries (Riddell, 1992). This theory focuses on the role of international aid, which is designed to accelerate economic growth in developing countries and ensure the sustainability of growth, but mainly not to improve living standards. The economic motive for FDI is present in both developed and developing countries. Developed countries have an interest in investing in developing countries to improve their welfare. If the key rate in developing countries is higher than the productivity of capital in developed countries, both sides benefit (Kim, 2011). It should be noted that after imposing sanctions, the key rate in Russia was steadily growing until the end of 2016.

Finally, there is a theory regarding the marginal efficiency of investments (MEI) and accelerator theory. The maximum efficiency of investments is the expected rate of return on the investment project implemented by the company. As a rule, companies compare the maximum efficiency of investments, abbreviated as MEI, for physical capital with the rate of return on financial investments when deciding on the implementation of an investment project.

According to this theory, FDI occurs when the MEI for additional investment is higher than the value of the funds used for such investment. MEI refers to the profitability of an internal project and its rate at which the net present value of the project (in this case, FDI) is zero. This theory is also called investment theory and is based on Keynes' work. Further development of this theory is accelerated, and it considers investments (FDI) in linear dependence on changes at the input. Based on this theory, where there is a more significant gap between the existing capital stock and the desired one, the firm's level of investment is quite high (Kim, 2011).

The next chapter will extend the research of the motivation to invest in the oil and gas industry by considering the specific factors that impact on the attractiveness of the industry.

1.2. Classification and theoretical aspects of the impact of the main macroeconomic factors on the investment attractiveness of the oil industry

In continuation of the research, it will be characterized specific features of investment attractiveness factors in the oil industry. To begin with, the author will define the distinguishing features of the industry that will determine the priority and most influential factors of investment attractiveness. These features include the following:

- The high volume of capital investments and high dependence on them;
- Dependence on natural reserves, the volumes of which are limited and non-renewable, greater diversification of the quality of the raw materials extracted;
- Dependence on geological exploration and a high degree of risk in investing in it;
- The non-local character of production: the vast geographical extent of deposits, inaccessibility of some of them;
- Lack of production mobility;
- Long construction period;
- Dependence on other sectors of the economy.

For comparison, it is worth considering two systems for assessing the investment attractiveness of the oil industry. The first one was proposed by Russian researchers Rodionov I.I. and Protasov V.S. in the article "Consideration of industry factors in the analysis of investment behavior of companies (on the example of the oil and gas industry)" (Rodionov I.I. and Protasov V.S., 2010). The second valuation model was developed by a group of Canadian researchers from the Fraser Institute, who, based on their index, annually analyze the investment attractiveness of the country and make up the ratings of all the world's largest oil centers.

Russian researchers chose the essential factors in their opinion and built them hierarchically.

They put oil price level and volatility on the top of the list. Further on, the financial indicators of the region/country/company were marked by importance: profitability of production, income, reserves, the ratio of own and borrowed funds,

availability of credit resources. The next point is the industry restrictions: the volume of reserves, the quality of raw materials. Also, a separate point of their attention was given to the indicators of development prospects: strategic plans, forecasts of growth in prices for raw materials and oil products, as well as a separate category of possible investment risks. These indicators are by no means less necessary than the others, because, as has been described earlier, there is a separate risk-based approach to assessing the attractiveness of the investment.

The author will review the most important of the above factors. First, the price of oil, the researchers who proposed this model, called it the engine of investment attractiveness of the industry. This factor is decisive for the economies of producing countries as a whole, which is also relevant to Russia. Regarding the industry itself, the price of resources will be reflected in changes in the following important indicators for investors: profitability, volumes of financial flows, risks. In order to diversify the risks associated with changes in oil prices, investors may also invest in industries whose indicators will, on the contrary, be inversely proportional to changes in resource prices: refining and petrochemical industries. This is one way of insuring against the risks of losses associated with falling oil prices.

Government support in the industry is significant for attracting investment. It can be expressed in privileges on credit resources, and a positive effect can even cause the state monopolization of the industry. For example, the state retains a monopoly on natural gas exports for Gazprom, which dramatically increases the company's attractiveness to investors.

Industry investment barriers can be divided into several groups: natural (geological and geo-climatic), technological and institutional. Natural reserves of raw materials characterize the first group. The second group includes the following limitations:

- the geographical remoteness of the fields from the transport arteries, based on this indicator, the development of some of them are recognized as economically unprofitable;
- the complexity of the development of some types of soil,

- the inaccessibility of mining,
- the lack of technology to work with certain types of soils and landscapes.

Restrictions of this type also include the formalization of the status of strategic reserves for specific territories. A serious institutional barrier is a legal ban on the presence of foreign capital in the extractive industries. This restriction is typical for Russia, which significantly reduces its investment attractiveness.

The next factor is strategic planning. Availability of a quality strategic plan provides excellent opportunities for managed growth of indicators. This also includes forecasting of possible price changes in the short and long term. The forecasts of these changes often guide investors.

There is a distinctive feature of the industry that limits investment - inertia, it is an objective characteristic for the industry as a whole and is almost insensitive to targeted measures to change it. The following parameters cause it: long terms for the implementation of projects and obtaining financial results from the invested funds, legal requirements for licensing, the regular requirement for renewal of fields due to the depletion of old ones, the need for a constant flow of investment. These are the restrictions that reduce the investment attractiveness of the industry as a whole.

Summing up the proposed approach to assessing the investment attractiveness of the oil industry, it can be concluded that the price of oil plays a vital role. In addition to this factor, the authors recognize the importance of indicators such as the financial performance of the region/country/firm, the region/country's sectoral constraints, and the institutional environment.

The following valuation model, which is critical to consider in this paper, was developed by a group of Canadian scientists from the Fraser Institute and presented in their annual review of the oil industry investment prospects "Global Petroleum Survey" (Jackson T. and et.al., 2015). They proposed a slightly different way of calculating investment attractiveness by simulating the coefficient for comparing the attractiveness of oil-producing countries, which is a set of investment barriers. In their method, limitations play a significant role. As a result, the higher the coefficient the more

barriers stops the investment, thus the lower the attractiveness of the region for investors. There are 16 restriction factors as following:

1. State tax policy (except for taxes - sales taxes, capital gains tax, and others, this factor includes license fees, copyright payments);
2. Tax burden (the aggregate of all individual tax payments);
3. A set of environmental protection standards (stability and permanence of environmental policy);
4. System of control over compliance with the norms;
5. Price policy of the state;
6. Protection of territories (statuses of national parks, reserves, and others)
7. Trade barriers (tariff and non-tariff, currency restrictions);
8. Labor legislation (norms and their observance);
9. Quality of infrastructure;
10. Level of quality and completeness of geological information base;
11. Labor resources (supply and qualification of the labor force, mobility);
12. Location and requirements of residents;
13. Political stability;
14. Security (economic, criminal);
15. Regulation of relations between different levels of government;
16. Legal system.

Scientists have conducted a complicated study: for each of the analyzed countries, the degree of importance of a particular barrier was identified for the following five levels:

- the factor leads to an increase in investment attractiveness;
- does not prevent the attraction of investments;
- is a minor impediment to investment;
- a severe barrier to investment;
- completely stops the possibility of investing.

The greater the barrier, the higher the score for the country. The PPI (Policy Perception Index) was formed based on a set of indicators. All regions in the 2015

survey (126) were divided into several groups in terms of their oil production volumes. The first group includes 14 regions with the production of at least 1% of the world's total. Russia is also in second place after Iran in terms of reserves. The study excluded the reserves of Russia's Arctic shelf as hard-to-reach and unattractive for investment. However, even for the conditionally designated deposits as "Russia – Other" (other deposits) the indicator of barriers to investment attractiveness is very high. Therefore, the investment attractiveness of the country itself is low.

It should be noted that a significant limitation is the legal obstacles to the entry of foreign capital into the Russian extractive industry, thus overriding the interest of foreign investors. Therefore, the research of the Canadian scientists focused on the international market of the investment proposal, cannot be entirely indicative of Russia, as the largest investor in the Russian oil industry is still the state.

The lowest investment barriers and the highest investment attractiveness among the regions with the largest reserves are Texas (USA) - 11.07, United Arab Emirates - 31.33, Alberta (Canada) - 34.22, Qatar - 36.32 and Kuwait - 45.58. For comparison, the figure for Russia is 84.39. The three countries with the highest barriers to investment are Russia, Venezuela, and Libya, which together account for 30% of the total inventory of the countries studied.

The influence of a single factor is complicated to determine, as the value of the indicator changes depending on the combination with other factors; thus, the totality of indicators is always assessed. Some important ones can be identified to create a practical evaluation model. However, some factors can be quantified and expressed with sufficient precision, which simplifies the work with them and provides additional opportunities for data processing and analysis.

When researchers create factor models, they are faced with the challenge of determining the equivalent of the factors to be measured: some of them are statistically quantifiable, others cannot be counted. Therefore, a system of coefficients is often created to determine the degree of influence, as following:

1. factor that dramatically increases the investment attractiveness;
2. factor that insignificantly increases the investment attractiveness;

3. neutral factor - does not influence;
4. reduce factor – has a negative impact on the investment attractiveness;
5. factor that reduces the investment attractiveness to a substantial degree.

The degree of influence is determined based on expert assessment. An important task is to identify the critical factors of investment attractiveness for the country, region, or industry.

Dependence of investment attractiveness on the factor can be direct and inverse. In the first case, the higher the value of the factor, the higher the investment attractiveness, in the second case - inversely proportional. However, there are some situations where the same factor can influence positively in some conditions, and negatively in others.

An important conclusion of such an analysis is the following statement: how strong and dominant is the price of oil, the development of the industry, in the long run, depends on cooperation with foreign investors and suppliers of technology. In this case, it is the restrictions on the political factor that are of great importance.

Thus, the statement that the influence of one of the factors can be considered only in conjunction with the others is fully confirmed. However, for the oil industry, the oil price factor is so dominant over the rest that, regardless of changes in other factors, it will have the same effect: an increase in the price will be a signal to investment inflows, while a decrease in the price will have a negative impact on the investment attractiveness of the industry.

1.3. Impact of sanctions on the Russian Federation

Many Russian economists have assessed the impact of sanctions on the domestic economy using various methods. For example, members of the Economic Expert Group of the Economic Council under the President of the Russian Federation Elena Gurvich and Igor Prilepsky assessed the impact of restrictions on access to loans on international capital markets for two scenarios (with oil prices of $100 and $50 per barrel). They have shown that the effect of sanctions increases with falling oil prices, as export revenues fall and capital losses as a share of GDP increase. As a result, in the

scenario with sanctions, investments in fixed assets in 2014-2017 are, on average, 3.5% lower than in the scenario without sanctions, and retail trade turnover is 2.6% lower (Gurvich E. and Prilepsky I., 2016). The authors estimate the net outflow of capital caused by sanctions at $58bn in 2014 and $160-170bn in 2014-2017.

According to estimates of several experts, Russia has already lost 25 billion euros or 1.5% of GDP and 75 billion euros or 4.5% of GDP in 2015 from sanctions in 2016. In total, Russia lost about 100 billion Euros over two years. In the medium term, according to the IMF forecasts, the accumulated losses of the economy will amount to 9% of GDP, including due to a slowdown in productivity growth (Volkoff O., 2016).

The impact of sanctions on raw materials, mining, processing, and machine-building industries is long-term and can only be seen after some time. Russian companies face mainly problems related to the acquisition of specific technologies. This is the case with oil and gas production when companies have to resort to foreign partners for exploration and drilling. Technological sanctions have not yet had an impact on the economy: they were aimed at reducing the potential for hard-to-recover oil production, rather than against current production, which is at record levels. In 2015, the companies' production potential was reduced, not against current production, which is a record level. Russia extracted 534 million tons of crude oil, a maximum in post-Soviet history. According to experts, the maximum effect was produced by financial sanctions: foreign capital markets for Russian companies were mostly closed, which limits investment opportunities and, consequently, import substitution in the Russian economy. One of the main problems for Russia is that up until the 2014 crisis, it used funds raised on international financial markets to finance its operations.

It should be noted that by the end of 2015, the foreign exchange reserves of the Central Bank of the Russian Federation fell to $459.9bn against $509.6 bn at the beginning of 2015. Such negative dynamics appeared only for the second time in the history of Russia since 1991 and for the first time since the end of 2009. (Article: "Impact of sanctions on the Russian economy...", 2015). In the long run, sanctions may have a more serious negative impact.

At the same time, several experts believe that Western sanctions have almost no impact on the Russian economy. Oil prices remain the key factor behind the decline in GDP, according to a Citigroup review entitled "Russia is not too concerned about sanctions." It notes that sanctions account for only 10% of the observed decline in production. The West's view that sanctions have had a significant impact on Russia's GDP stems mainly from the fact that their introduction in early and mid-2014 coincided with the beginning of a significant slowdown in the Russian economy. In the third quarter of 2014, for the first time after the 2008-2009 crisis, the Russian GDP showed negative growth rates. However, it was in the third quarter of 2014 that the decline in oil prices began, which became the critical factor in the decline in GDP, the Citigroup report says. "Oil prices remain the key factor leading to a decline in GDP, and it is the decline in oil prices that explains about 90% of the decline in production," the report says. According to calculations, a decrease in oil prices by $10 per barrel leads to a 0.8% reduction in Russian GDP (Sharoyan S., 2015).

Domanska and Kardas (2016) describe the impact of sanctions on various macroeconomic indicators, as well as the sectors of the Russian economy in the short and potentially long term. Domanska and Kardas point out that Russian companies have started to raise capital from the East (mainly from China and India) and are generally correcting the effects of financial and technological sanctions, although the authors note that the effects of sanctions, especially technical ones, might be more noticeable in the long run. The authors conclude that sanctions are not a main problem for the Russian economy, and in particular, for the oil and gas sector, but they are a significant obstacle for the Russian economy to neutralize the consequences of the financial crisis caused by the significant drop in world oil prices.

Mae, in his paper (Mae, 2016), analyzes the impact of sanctions on the Russian oil sector by analyzing the volume of oil exports and production and describes the potential long-term impact of technological sanctions. The author determined that the sanctions did not affect fields that were already in operation and joint ventures, which allowed Russian companies to increase oil production and exports. However, the author notes that the lack of funds has forced oil producers to reduce investment, which

should lead to reduced production and exports in the future. The author also notes that restrictions on technology imports may have a long-term effect, as Russian companies are currently unable to replace existing equipment with new equipment from their resources.

Based on the articles, that were analyzed, it can be concluded that even if anti-Russian sanctions had a small effect on the economy of the country, they might lead to a significant distortion for Russia in the long-term period.

2. IMPACT OF IMPOSED SANCTIONS ON THE RUSSIA OIL AND GAS SECTOR

2.1. Specifics of the imposed sanctions policy against Russia since 2014

In 2014, following the seizure of the Crimean Peninsula to the Russian Federation and the conflict in eastern Ukraine, Western countries and their allies began to impose sanctions on Russia. The United States of America became the initiator of the sanctions policy against the Russian Federation, and later European Union countries joined the sanctions policy against Russia. Also, the G7 countries and some other countries that are partners of the United States of America and the European Union joined the sanctions.

The sanctions imposed by the European Union in 2014 affected the oil industry, as well as aircraft construction and the defence sector. Additional restrictions affect the supply of goods and technologies to the Russian Federation that can be put into operation in the civil and defence industries. Restrictions have been imposed on the technologies and equipment needed to develop offshore fields.

The European Union has imposed restrictions on such significant banks of the Russian Federation as Sberbank, VEB, Rosselkhozbank, VTB, Gazprombank. Rosneft, Transneft, Gazprom Neft, and Uralvagonzavod are also subject to restrictions. Citizens and companies of the European Union are prohibited from trading in their securities for more than 30 days. Also, these companies are prohibited from transactions with European banks, investment consultations, portfolio investment management, and organization of securities placements.

The U.S. sanctions were far more extensive than those imposed by the European Union and affected more than 90% of the Russian oil and gas industry and almost all of Russia's gas production.

The Russian gas giants Gazprom, Rosneft, Novatek, Transneft, and Gazprom Neft have lost access to the American capital market. Russia's largest oil producers, Rosneft, and Gazprom Neft have also lost access to the American capital market. At the same time, the sanctions also affected the Americans themselves. Exxon Mobil had to curtail his joint projects with the Russian oil company "Rosneft".

The U.S. sanctions list includes such Russian oil and gas companies as Gazprom, Rosneft, Lukoil, Surgutneftegaz, Gazpromneft, and Novatek. U.S. companies cannot supply these Russian companies with goods and technologies that are necessary for the development of oil fields in deep water and on the Arctic shelf.

The U.S. sanctions even affected private oil producers, which were not related to the events that took place in Ukraine in 2014. The presence of Lukoil and Surgutneftegas, the largest private oil companies in the Russian Federation, on the sanctions list was surprising. This, in turn, does not prevent Lukoil from participating in various projects, including those involving foreign companies, such as the "Umid-Babek" project in Azerbaijan, with the participation of Total.

Transneft did not have any problems either, since Transneft's dependence on American and European lenders is not particularly high, and the ban on the transfer of Transneft's technology and equipment is not relevant.

From this, we can conclude that not all Russian oil and gas companies are severely affected by sanctions, and foreign oil and gas companies, despite the restrictions imposed by their governments, continue to actively cooperate with Russian oil and gas companies in oil and gas projects in the Russian Federation.

2.2. Dynamics of foreign investments in the development of the Russian oil and gas complex at the present stage

In order to understand what trends are taking place in the Russian oil and gas sector, it is necessary to consider in detail the dynamics of foreign investment in the Russian oil and gas sector.

Foreign investments are classified as a foreign direct investment (FDI), portfolio foreign investment, and other foreign investment.

Foreign direct investment is made for long-term investor control over assets and increasing profits through investment in industries in other countries in order to obtain higher profits than in the country of origin of capital. For this purpose, the ownership share of the company should be more than 10%. The FDI investor is entitled to participate in the decision-making process.

Foreign portfolio investments are funds that are invested in the aggregate of different foreign securities. The aggregate of foreign securities is a portfolio, the assets of which include government bonds, shares, promissory notes, corporate bonds. The purpose of portfolio investments, as well as foreign direct investments, is to make a profit, but unlike foreign direct investments, portfolio investments do not give the investor the right to control the object of investment. This type of investment implies passive ownership of the portfolio for profit from the growth of securities prices or accrued dividends.

Other investments include all remaining international capital investments that are not classified as either foreign direct investments or portfolio investments. Other investments include trade loans, loans from international financial institutions, cash on hand, deposits, bank deposits, loans, and others. The essence of such investments is to finance investment projects in the host country (Legislation of the Russian Federation).

In order to see the structure of foreign investments in the Russian oil and gas complex, the author of the study considered the accumulated foreign investments in the Russian oil and gas complex in terms of direct, portfolio and other investments in Table 1.

The author of the work used the data of the Unified Interdepartmental Information and Statistical System (UIISS) and Central Bank of Russian Federation, which publish statistical data on accumulated foreign investments in the context of direct, portfolio, and other, the author considers the dynamics of foreign investment in the period from 2011 to 2018, to see the percentage ratio of direct, portfolio and other investments to the total number of accumulated foreign investments.

As can be seen from the table, most foreigners invest in the Russian oil and gas complex other investments. This situation can be explained by the fact that foreigners are crediting oil and gas projects in Russia. Direct foreign investments are in second place, and portfolio investments are the least.

Table 1. Accumulated foreign investment

Parameter		Direct investment	Portfolio investment	Other investment	Grant total
2011	mln USD	12,129	482.6722	34,183	**46,795**
	%	25.9%	1.0%	73.0%	**100%**
2012	mln USD	12,141	526.45	36,261	**48,929**
	%	24.8%	1.1%	74.1%	**100%**
2013	mln USD	22,702	1095.4373	36,365	**60,163**
	%	37.7%	1.8%	60.4%	**100%**
2014	mln USD	15,844	1164.812	71,244	**88,254**
	%	18.0%	1.3%	80.7%	**100%**
2015	mln USD	15,843	973.3268	61,460	**78,276**
	%	20.2%	1.2%	78.5%	**100%**
2016	mln USD	30,332	1338.214	74,623	**106,293**
	%	28.5%	1.3%	70.2%	**100%**
2017	mln USD	25,418	2058.0477	90,721	**118,197**
	%	21.5%	1.7%	76.8%	**100%**
2018	mln USD	24,515	2805.7899	104,623	**131,943**
	%	18.6%	2.1%	79.3%	**100%**

Source: UIISS https://www.fedstat.ru/

Foreign direct investment is the most indicative, as FDI in order to take an active part in asset control in the future reflects a long-term economic interest in starting a business in the Russian Federation. From the dynamics of foreign direct investment in oil and gas production (Figure 1), it can be noticed that sanctions have not severely affected this type of investment by foreigners. Moreover, the graph shows that in the 4th quarter of 2016, the FDI inflow was 4 times higher than the average for all quarters in the period under review and further after the levelling in the 1st quarter of 2017, the FDI inflow is also on the rise, after which in the 1st quarter of 2018 it starts to decline.

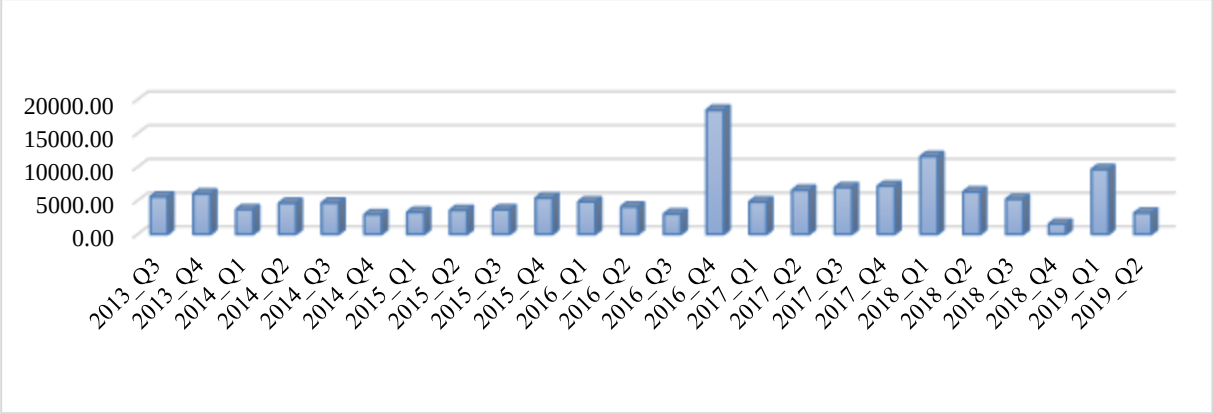

Figure 1. Dynamics of foreign direct investment in the Russian oil and gas sector, mn USD

Source: Central Bank of the Russian Federation: https://www.cbr.ru/

The most significant Russian oil and gas projects with the attraction of foreign investments are Sakhalin-1, Sakhalin-2, Yamal LNG, Far Eastern LNG, and others, which are still actual even after imposing sanctions. Russian oil and gas companies continue cooperate with Exxon Mobil, Shell, Mitsubishi and others.

Therefore, it can be concluded that even though the imposed sanctions had an impact on the work of some Russian oil and gas companies, in general, they had an insignificant impact on the inflow of foreign direct investment. In order to confirm this conclusion, the third chapter will conduct an empirical analysis of the factors influencing the inflow of FDI in the Russian oil and gas industry.

3. EMPIRICAL ANALYSIS OF FACTORS INFLUENCING ON THE INFLOW OF FDI IN RUSSIAN OIL AND GAS INDUSTRY

3.1 Justification of choosing variables

The inflow of FDI to the Russian oil and gas industry is affected by several factors. Regarding the reviewed literature, the author decided to include the essential variables that affect the FDI, in particular, the price of Brent oil, the level of GDP in Russian economy, the key rate, the Ruble USD exchange rate, the level of oil production in Russia, the type of ownership of oil companies and Sanctions themselves. All statistical data were collected from the Unified Interdepartmental Information and Statistical System, Federal State Statistics Service, official websites of oil companies, and Central bank of the Russian Federation.

According to several analytical works on the analysis of the financial crisis in Russia, the main factor affecting the investment attractiveness of the Russian oil and gas sector was the level of oil production. Thus, the OilPro variable will be included in the models, but it will be divided by five main companies, in which oil production forms around 70-80% of the whole oil production in the Russian Federation (Figure 2). The rest will be represented by the sum of all other companies. As there are only annual data on the volume of oil production, so the author decided to divide the annual production by 4 to get the quarterly value.

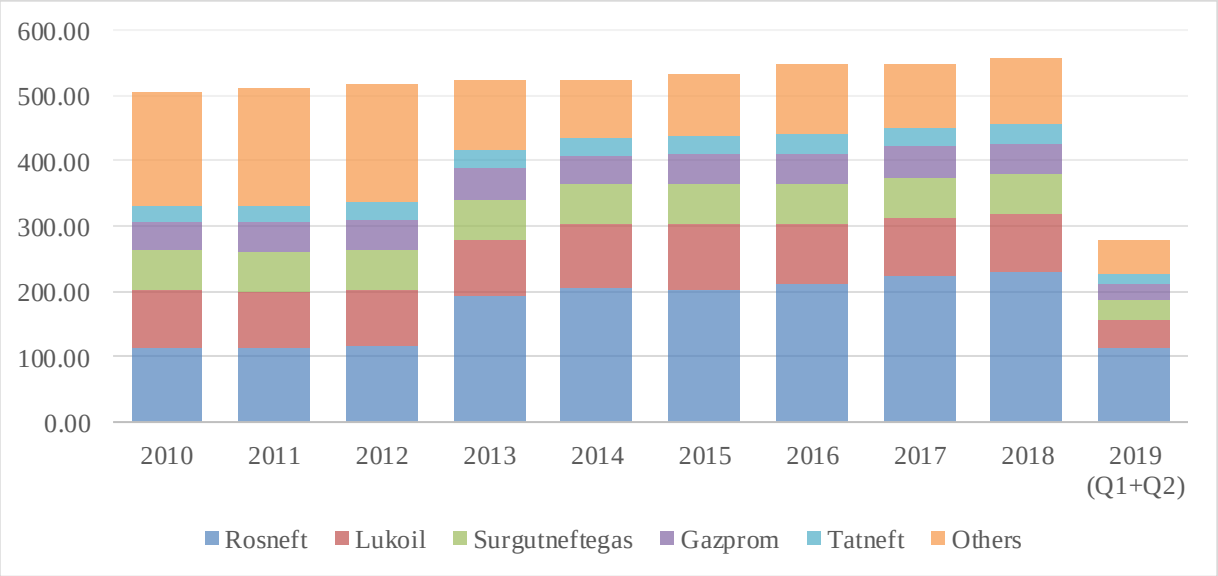

Figure 2. Oil production Russian oil companies, mn tons

Source: compiled by author based on the data from Gaidar Institute Publishers

Next, the variable responsible for sanctions against Russia will be included in the analysis, but sanctions are a non-quantitative parameter; thus, it was decided to use Sanctions as a binary variable, starting from the time of imposing Sanctions against Russia (from 2014).

In some of the analytical studies, the USD exchange rate influenced the Russian economy and the attractiveness for investors, so there is a reason to believe that the FDI will also depend on the USD exchange rate, which grew significantly during the period after imposing sanctions (Figure 3). Thus, the US dollar exchange rate will be introduced into the model as a *USDRUB* variable.

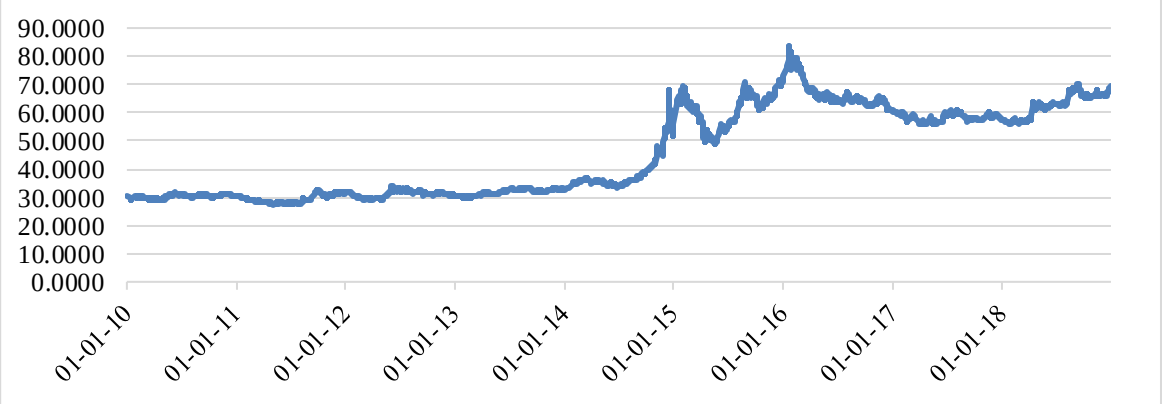

Figure 3. Exchange rate of the US dollar to the ruble

Source: Central Bank of Russian Federation: http://www.cbr.ru/currency_base/dynamics.aspx

Further, the level of GDP in the Russian economy can have a significant impact on the investment attractiveness so that the model will have a variable GDP.

Furthermore, the level of FDI is significantly affected by the level of Brent oil prices. Since oil prices are falling dramatically during the last five years, this may discourage investors from investing in the oil and gas sector (Figure 4). Therefore, the author decided to add the BrentOil variable to the analysis.

Also, the inflow of FDI in the Russian oil and gas industry may be affected by the type of ownership. Although state-owned companies may have more support internally and externally, as sanctions were imposed against the country and some of the companies themselves, this fact might impact the investment attractiveness of state-owned companies. Thus, the OwnerType binary variable has been added to the model (value 1 for state-owned companies). Three of five companies (Rosneft, Gazprom, and

Tatneft) are state-owned, and the rest, including other companies (to simplify the analysis), are private companies.

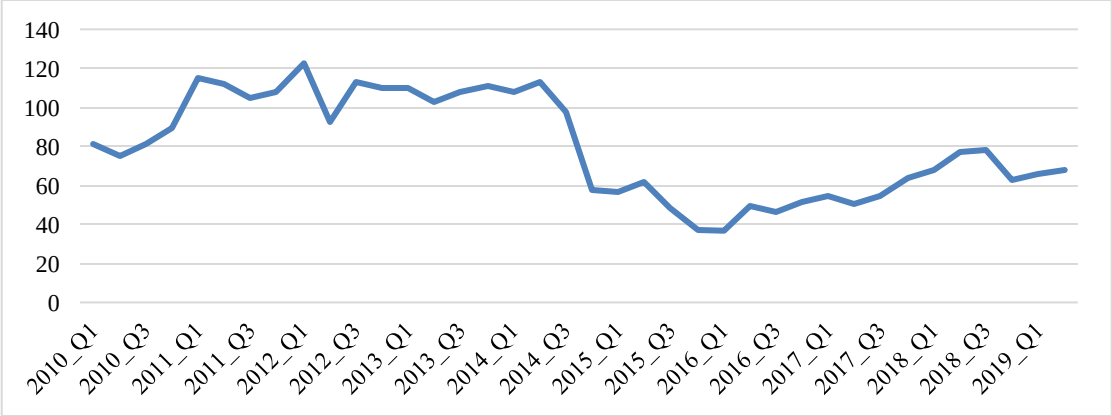

Figure 4. Brent Oil price trends over the period 2010-2019, USD

Source: The World Bank. URL: http://databank.worldbank.org/data

The last variable (Keyrate) introduced in the analysis is the level Key rate, determined by the Central Bank of Russia. Regarding some economic papers, the level of Key rate in the country impacts the attraction of Investors, as it affects the development of the economy, level of inflation, and thus the willingness of foreign companies to invest in the oil and gas industry.

Thus, the regression model looks as follows:

$$DirectInv_i = b_i^0 + b_i^1 GDP + b_i^2 Brentoil + b_i^3 USDRUB + b_i^4 Sanctions + b_i^5 KeyRate + b_i^6 OilPro + b_i^7 OwnerType + \varepsilon_i \quad (1)$$

where: i is the company number.

The author uses a panel dataset, the programming language R and RStudio software, as R has a broad range of tools. For model analysis and data output, a number of libraries were used in RStudio (Figure 4).

```
> library(psych)
> library(knitr)
> library(dplyr)
> library(tidyverse)
> library(lmtest)
> library(plm)
> library(broom)
> library(memic)
> library(corrplot)
```

Figure 4. Used libraries in RStudio

Source: complied by the author in RStudio

3.2 Analysis of variables

In this chapter, the author provides the preliminary analysis of data - the descriptive statistics of all variables, and correlation and regression analysis of data. In conclusion, the obtained results are described, and the logical explanations are selected.

3.2.1. Descriptive statistics of data

```
> describe(Anjelika_Han_Parametrs)
           vars   n    mean     sd median trimmed    mad    min     max   range  skew kurtosis    se
GDP           1 228  442.20  93.66 422.70  441.35 110.63 253.92  619.79  365.86  0.14    -1.05  6.20
BrentOil      2 228   80.09  25.88  77.77   80.36  37.73  36.77  122.60   85.83  0.03    -1.44  1.71
USDRUB        3 228   46.61  15.84  41.80   46.10  18.75  27.99   74.63   46.64  0.16    -1.75  1.05
Sanctions     4 228    0.58   0.49   1.00    0.60   0.00   0.00    1.00    1.00 -0.32    -1.91  0.03
KeyRate       5 228    8.76   2.10   8.12    8.48   0.56   5.50   17.00   11.50  1.91     4.82  0.14
OilPro        6 228   22.13  14.40  18.30   20.18  10.24   6.53   57.65   51.12  1.10     0.19  0.95
DirectInv     7 228  784.87 863.88 519.24  620.63 401.41  71.99 7409.48 7337.49  3.41    17.62 57.21
OwnerType     8 228    0.50   0.50   0.50    0.50   0.74   0.00    1.00    1.00  0.00    -2.01  0.03
```

Figure 5. Summary statistics of all variables

Source: calculated by the author in RStudio.

Figure 5 shows the descriptive statistics of all variables. All variables have 228 observations, which is the total number of considered time periods multiplied by the number of companies. Moreover, it can be seen that the mean price of BrentOil equals 80.09 dollars per barrel, which is comparatively lower compared with the pre-crisis period price, and the mean USDRUB rate equals to 46.6, on the contrary, it is quite higher than the value at the beginning of 2014.

The Standard Deviation represents the dispersion of data relative to its mean, and calculated as follows:

$$SD = \frac{\sigma}{\sqrt{n}} \qquad (2)$$

Where: σ – the value of the standard deviation of the general population; n – sample volume.

As can be noted from Figure 4, there is a high standard deviation of the variable DirectInv, which means that the data points are further from the mean and there is a higher deviation within the data, thus the more spread out the data.

Regarding the variables Sanctions and OwnerType, they have values of 1 or 0, as sanctions were imposed in 2014, which means 58% of the sample values, and Russia controls three companies out of six – 50% of the sample values.

3.2.2. Correlation analysis

In this part, the author does the correlation analysis of all variables. Figure 8 and Figure 9 shows the correlation of variables.

```
> cor(Anjelika_Han_Parametrs)
                    GDP   BrentOil      USDRUB   Sanctions      KeyRate       OilPro
GDP         1.00000000  0.8449602 -0.72077970 -0.56084935 -0.462161111 -0.023073646
BrentOil    0.84496024  1.0000000 -0.86726100 -0.73326410 -0.564145503 -0.032203398
USDRUB     -0.72077970 -0.8672610  1.00000000  0.86014530  0.386236583  0.044880817
Sanctions  -0.56084935 -0.7332641  0.86014530  1.00000000  0.410016960  0.040949268
KeyRate    -0.46216111 -0.5641455  0.38623658  0.41001696  1.000000000  0.006096505
OilPro     -0.02307365 -0.0322034  0.04488082  0.04094927  0.006096505  1.000000000
DirectInv  -0.04745145 -0.1585008  0.22692365  0.21758841 -0.033039010  0.229191268
OwnerType   0.00000000  0.0000000  0.00000000  0.00000000  0.000000000 -0.060679911
              DirectInv   OwnerType
GDP        -0.04745145  0.00000000
BrentOil   -0.15850080  0.00000000
USDRUB      0.22692365  0.00000000
Sanctions   0.21758841  0.00000000
KeyRate    -0.03303901  0.00000000
OilPro      0.22919127 -0.06067991
DirectInv   1.00000000 -0.35428617
OwnerType  -0.35428617  1.00000000
```

Figure 6. Correlation coefficients of all variables

Source: calculated by the author in RStudio.

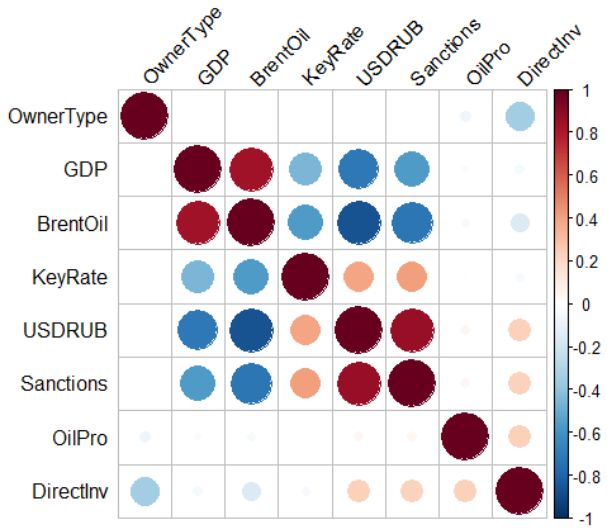

Figure 7. Correlation matrix

Source: built by the author in RStudio.

From the Figure 6, GDP and BrentOil have a strong downhill linear relationship with exchange rate (USDRUB), Sanctions and KeyRate, which can be explained by the fact that GDP and oil price fell dramatically just at the time when sanctions were imposed that, in turn, affected the changes in exchange rate and key rate. Meanwhile,

oil production does not have any correlation with other variables (less than 0.1) except Direct investments (0.23).

The strong correlation of other variables represents the presence of multicollinearity in the model, which can be eliminated by excluding variables. However, the author decided not to use this method in the model, as all variables play a significant role in finding the cause of the change in the inflow of FDI in the oil and gas industry, and continue regression analysis with multicollinearity, as it impacts the significance of the model, but coefficients stay unbiased.

3.2.3. Regression analysis

The author of the thesis decided to log all variables except binaries (Sanctions and OwnerType) in order to avoid any distortion in the regression model (Figure 8).

```
> log(Anjelika_Han_Parametrs)
# A tibble: 228 x 6
     GDP BrentOil USDRUB KeyRate OilPro DirectInv
   <dbl>    <dbl>  <dbl>   <dbl>  <dbl>     <dbl>
 1  5.81     4.40   3.40    2.11   3.34      5.72
 2  5.89     4.32   3.41    2.05   3.34      5.87
 3  5.98     4.39   3.42    2.05   3.34      5.66
 4  6.07     4.50   3.42    2.05   3.34      5.86
 5  6.10     4.75   3.38    2.08   3.35      5.77
 6  6.25     4.72   3.33    2.11   3.35      5.86
 7  6.30     4.65   3.37    2.11   3.35      5.88
 8  6.30     4.68   3.44    2.08   3.35      6.90
 9  6.22     4.81   3.41    2.08   3.38      5.78
10  6.28     4.52   3.43    2.08   3.38      5.96
# ... with 218 more rows
```

Figure 8. Logs of variables

Source: calculated by the author in RStudio

Heteroscedasticity test

The classical Breusch-Pagan test was used to examine data on the presence of heteroscedasticity, as it is one of the commonly used tests that checks the linear dependence of the random error dispersion on some set of variables.

Hypothesis:

H_0: $Var(\varepsilon_i) = \sigma^2 \; for \; all \; i$

The null hypothesis of the Breusch-Pagan test says that the variance is unchanging in the residual. So, if the p-value is less than 0.05, the heteroscedasticity must be rejected.

Based on the chosen variables, the Breusch-Pagan test is as in Figure 9.

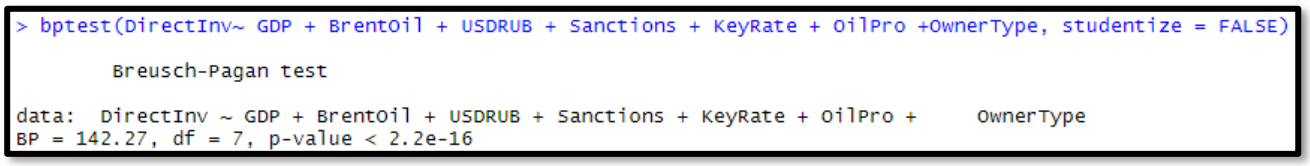

Figure 9. Breusch-Pagan test

Source: calculated by the author in RStudio

As can be seen from the figure p-value is almost zero, and as it was written above, it means that the H_0 (homoscedasticity) is rejected. As heteroscedasticity affects the effectiveness of variable estimates, the following models will use standard errors in the form of White (heteroscedasticity consistent standard error).

Model testing

Generally, the panel data set has the following structure:

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

where: y_i is the dependent variable for the object i at time t; X_i – set of independent variables; ε_i - the corresponding error.

By applying to the chosen variables, the number of objects is 6 (the number of 5 leading oil companies with the rest companies united in one group), the number of independent variables is 7, and the number of time periods is 38.

In this empirical part, the author tests three models:

- The Pooled Model;
- The panel data model with random effects;
- The panel data model with fixed effects.

All models are expressed as follows:

$$y_{it} = \alpha + x'_{it}\beta + n'_i\gamma + l_i + m_{it} \qquad (5)$$

where: n_i' is a vector that includes parameters that do not change over time; m_{it} and l_i are random components in which mathematical expectation equals to 0.

Pooled model

This a standard linear regression model that assumes that the dependent variable depends linearly on all variables at the same moments of time, so it does not take into account the time effects.

```
> summary(Anjelika_Han_pooling)
Pooling Model

Call:
plm(formula = DirectInv ~ GDP + BrentOil + USDRUB + Sanctions +
    KeyRate + OilPro + OwnerType, data = pdata, model = "pooling")

Balanced Panel: n = 6, T = 38, N = 228

Residuals:
     Min.   1st Qu.    Median   3rd Qu.      Max.
-2.111805 -0.326791 -0.031221  0.413064  1.993452

Coefficients:
             Estimate Std. Error t-value  Pr(>|t|)
(Intercept) -3.644137   3.159129 -1.1535   0.24995
GDP          1.456508   0.358670  4.0609 6.799e-05 ***
BrentOil    -0.491724   0.354648 -1.3865   0.16699
USDRUB       0.777471   0.382042  2.0350   0.04305 *
Sanctions    0.155391   0.190882  0.8141   0.41649
KeyRate     -0.693692   0.269373 -2.5752   0.01067 *
OilPro       0.656578   0.068222  9.6241 < 2.2e-16 ***
OwnerType   -0.501110   0.086603 -5.7863 2.456e-08 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    178.82
Residual Sum of Squares: 86.285
R-Squared:      0.51748
Adj. R-Squared: 0.50213
F-statistic: 33.7063 on 7 and 220 DF, p-value: < 2.22e-16
```

Model 1. Pooled model

Source: calculated by the author in RStudio

Model 1 shows that the adjusted R-square is 0.50, which evidence of good model quality. Based on the p-values of explanatory variables, it can be noted that almost all variables are insignificant on the level of 5% or 10%, except for OilPro, GDP, and OwnerType. The reason for such results may be in the simplicity of the model that it does not include time effect.

Panel data model with random effects

The model is based on the structure of panel data, which allows to take into account the immeasurable individual differences of objects. However, it assumes that individual differences are random.

```
> summary(Anjelika_Han_random)
Oneway (individual) effect Random Effect Model
   (Swamy-Arora's transformation)

Call:
plm(formula = DirectInv ~ GDP + BrentOil + USDRUB + Sanctions +
    KeyRate + OilPro + OwnerType, data = pdata, model = "random")

Balanced Panel: n = 6, T = 38, N = 228

Effects:
                 var std.dev share
idiosyncratic 0.2570  0.5070 0.497
individual    0.2604  0.5103 0.503
theta: 0.8409

Residuals:
      Min.    1st Qu.     Median    3rd Qu.       Max.
-1.7927226 -0.2477473  0.0056568  0.2202058  1.5149832

Coefficients:
            Estimate Std. Error z-value  Pr(>|z|)
(Intercept) -3.23791    2.60540 -1.2428  0.213953
GDP          1.45899    0.28991  5.0326 4.839e-07 ***
BrentOil    -0.48869    0.28666 -1.7048  0.088239 .
USDRUB       0.79505    0.30934  2.5702  0.010165 *
Sanctions    0.15235    0.15431  0.9873  0.323516
KeyRate     -0.69663    0.21774 -3.1993  0.001378 **
OilPro       0.49654    0.17681  2.8083  0.004980 **
OwnerType   -0.55948    0.42628 -1.3125  0.189358
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    84.128
Residual Sum of Squares: 56.368
R-Squared:      0.32998
Adj. R-Squared: 0.30866
Chisq: 108.347 on 7 DF, p-value: < 2.22e-16
```

Model 2. Panel data model with random effect

Source: calculated by the author in RStudio

The model 2 shows a lower adjusted R-square (0.308), which means that parameters explain the dependent variable not that well as the pooled model. Almost all variables are significant at some level except Sanctions and OwnerType.

Panel data model with fixed effects

This model provides a guaranteed unbiased and meaningful estimate, as the effects are interpreted as a hindering parameter, and the estimate is aimed at eliminating them.

```
> summary(Anjelika_Han_fixed)
Oneway (individual) effect Within Model

Call:
plm(formula = DirectInv ~ GDP + BrentOil + USDRUB + Sanctions +
    KeyRate + OilPro + OwnerType, data = pdata, model = "within")

Balanced Panel: n = 6, T = 38, N = 228

Residuals:
      Min.    1st Qu.     Median    3rd Qu.       Max.
-1.7765186 -0.2222687  0.0029675  0.2011321  1.4235939

Coefficients:
           Estimate Std. Error t-value  Pr(>|t|)
GDP         1.45987    0.29036  5.0277 1.041e-06 ***
BrentOil   -0.48763    0.28711 -1.6984  0.090879 .
USDRUB      0.80124    0.31001  2.5845  0.010409 *
Sanctions   0.15128    0.15457  0.9787  0.328811
KeyRate    -0.69766    0.21809 -3.1990  0.001586 **
OilPro      0.44023    0.20327  2.1657  0.031431 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    81.669
Residual Sum of Squares: 55.515
R-Squared:      0.32024
Adj. R-Squared: 0.28562
F-statistic: 16.96 on 6 and 216 DF, p-value: 5.0116e-16
```

Model 3. Panel data model with fixed effects

Source: calculated by the author in RStudio

Variable OwnerType was excluded from the model, as it does not allow to estimate γ (formula 5).

The results of model 3 show that adjusted R-square equals 0.28562, which means that parameters do not fully explain the dependent variable. Almost all variables are significant at some level except Sanctions and BrentOil.

Comparison of models

All three models are significant, but as it was mentioned above, the pooled model has one disadvantage in comparison with two other models. For the comparison of the pooled model and panel data models with the fixed effect, the author used F-test.

```
> pFtest(Anjelika_Han_fixed, Anjelika_Han_pooling)

        F test for individual effects

data:  DirectInv ~ GDP + BrentOil + USDRUB + Sanctions + KeyRate + OilPro +  ...
F = 29.931, df1 = 4, df2 = 216, p-value < 2.2e-16
alternative hypothesis: significant effects
```

Figure 10. F-test

Source: calculated by the author in RStudio

H_0 says that the pooled effect fits the data as well as a model with fixed effect, while H_1 states that model with the fixed effect fits data better than the pooled model. Figure 10 represents that F-statistics equals 29.931 at 4 and 216 degrees of freedom, while the p-value is close to zero. Therefore, H_0 is rejected and can be concluded that the model with fixed effect fits data better than the pooled model, despite the fact that adjusted R-square in the pooled model is higher than in the model with fixed effect.

Further, the author compares the pooled model and panel model with the random effect using the Lagrange Multiplier test.

```
> plmtest(Anjelika_Han_pooling, type = "bp")

        Lagrange Multiplier Test - (Breusch-Pagan) for balanced panels

data:  DirectInv ~ OwnerType + GDP + BrentOil + USDRUB + Sanctions +  ...
chisq = 292.1, df = 1, p-value < 2.2e-16
alternative hypothesis: significant effects
```

Figure 11. Lagrange Multiplier Test

Source: calculated by the author in RStudio

This is a statistical test used to check the limitations of statistical models' parameters, estimated on the basis of sample data. H_0 says that the pooled model with l_i (formula 5) equals to 0 is correct. As can be seen from Figure 11, *chisq* equals 292.1, and the p-value is close to zero, which means that the null hypothesis should be rejected.

The last comparison between the two panel models with fixed and random effects is made with the use of the Hausmann test. It detects predictor variables in the regression model. In this case, H_0 is that the preferred model is with random effect, while H_1 says that model with fixed effect better fits the data.

```
> phtest(Anjelika_Han_random,Anjelika_Han_fixed)

        Hausman Test

data:  DirectInv ~ OwnerType + GDP + BrentOil + USDRUB + Sanctions +  ...
chisq = 0.19981, df = 6, p-value = 0.9998
alternative hypothesis: one model is inconsistent
```

Figure 12. Hausman test

Source: calculated by the author in RStudio

Figure 12 shows that the p-value is almost 1, which means that the null hypothesis can be accepted. Thus, the panel model with a random effect fits the data better than the model with the fixed effect.

3.3. The analysis of the obtained results

Based on the results of all three models, it can be seen that the coefficient of Sanctions does not have a negative impact on the inflow of foreign direct investments to the Russian oil and gas sector. Therefore, **Hypothesis 1 is rejected**, and the imposing of sanctions by the US and EU countries does not influence negatively on the investment attractiveness of oil and gas companies. This fact can be explained by several reasons:

- Sanctions do not have a quick effect, and their impact can be seen in the long term, as some sanctions have been imposed on the supply of equipment and technology transfer, there is no visible negative impact in the short term;
- The possible negative effect of sanctions is compensated by the influence of other factors, in particular, an increase in oil production and implementation of prospective projects with participation of foreign investors, as mentioned above;
- The impact of sanctions should be studied more detailed and consider the direct and indirect influence of each group of sanctions.

The GDP is the most significant variable with the positive coefficient in all three models, so the GDP of the country plays a significant role in the investment attractiveness of its companies (**Hypothesis 2 is confirmed**). With the growth of GDP in the country, the purchasing power of the population and the volume of the domestic market increases. Therefore, it makes foreign investments in this country more profitable, with a focus on meeting the needs of the domestic market.

Regarding empirical analyze coefficients of BrentOil and USDRUB in the panel model with random effect have the level of significance as 10% and 5%, respectively. As can be seen from the model, the coefficient of BrentOil is negative, while the USDRUB has a positive coefficient, which means that **Hypothesis 3 can be partially confirmed**.

Due to the fact that the binary variable is not significant in the panel model with the random effect, **Hypothesis 4 is rejected**. The type of ownership of oil and gas companies does not have any impact on the inflow of FDI.

In the comparison among three types of models, the panel model with random effect was chosen as the model which fits the data the best. This may be explained by the fact that there is homoscedasticity in the Russian oil and gas sector, as Russia has a high state involvement in the oil and gas industry.

CONCLUSION

In the course of dissertation work, the author conducted a comprehensive review of foreign investments in the Russian oil and gas sector and how they are affected by sanctions imposed by the EU and the USA in connection with the political crisis and the subsequent economic crisis.

Various theories related directly or indirectly to foreign investments such as the "flying geese" paradigm of the Japanese economist Akamatsu, the life cycle theory of the American economist R. Vernon, the theory of market imperfection of the American economist S. H. Hymer and the theory of competitive advantages of the American economist Michael Porter was considered. In the course of a detailed analysis of each theory, those that can be applied to the oil and gas complex in Russia and explain the motives for the inflow of foreign direct investment into the Russian economy were identified.

The author considered the sanctions imposed on the Russian Federation and concluded that the sanctions against the Russian Federation had mainly affected the oil and gas complex, as well as the aviation and defence complex in part. It was discussed how the sanctions affect the development of the country's economy as a whole. However, there are a lot of contradictory opinions regarding the level of impact of imposed sanctions.

The author also presented the dynamics of foreign investments in the Russian oil and gas sector in terms of foreign direct investments, portfolio investments, and other investments and analyzed the impact of sanctions on the inflow.

Regarding the empirical part, five main oil companies were selected for the analysis, as their total oil production is 70-80% out of the whole production in Russia, and the rest companies were represented by the variable “Other”. The values of the variables were processed on a quarterly basis; thus, panel data was obtained.

The empirical part 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 has been selected, and based on the results of the analysis, it was concluded that the pooled model and the model with the fixed effect were not suitable for the analysis of available data.

Almost all coefficients are significant, except binary variables (Sanctions and type of ownership). It could be seen from the results that GDP has a significant impact on the inflow of FDI in the oil and gas industry.

In conclusion, based on the results of the panel model with random effect, only Hypothesis 2 was fully confirmed, while Hypothesis 1 and Hypothesis 4 were rejected, and in Hypothesis 3, only a part of it was confirmed. However, even though present study showed that sanctions do have a significant effect on the FDI, it should be noted that sanctions against the Russian oil and gas industry, in particular, technological sanctions may have a long-term effect, which was not studied by the author.

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