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## **Influence of sanctions on the external trade of Russia**

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Master in Management

Supervisor:  
Prof. Szabolcs Sebestyén, Assistant Professor,  
ISCTE Business School, Department of Finance

October, 2020







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Department of Marketing, Strategy and Operations

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## **Acknowledgements**

One more thesis has been finished and I feel very excited that now I know more than one year ago. The thesis turned out to be the most challenging period of my studies. This work is the resume of the knowledge I acquired and it required a total dedication and a lot of efforts.

Much of my gratefulness is dedicated to my supervisor, Szabolcs Sebestyén, whom I appreciate for his time, availability, readiness to help, and an admirable gift for explanation. One of the most important features of my supervisor is, by all means, ability to inspire a student and proceed with the same contagious enthusiasm up to the end of the thesis.

Last, but not the least, my thanks go to the site of EU Sanctions: <https://www.europeansanctions.com/>, that gave an access to the data of sanctions against Russia.



## **Resumo**

O impacto das sanções impostas pelos países ocidentais à Rússia desde março de 2014, dada a sua influência na economia da Rússia e de outros países, tem sido objeto de muito interesse e discussão. As sanções têm impacto no comércio internacional, na estabilidade econômica e nas relações entre os países. Esta tese estima a influência das sanções na economia da Rússia recorrendo à análise de regressão múltipla. Descubro que, embora as sanções tenham afetado fortemente a economia russa, a relação entre as variáveis explicativas nas exportações e importações russas não mudou devido às sanções. Também encontro evidências estatísticas convincentes de que o comércio externo da Rússia depende fortemente do preço do petróleo Brent. Os testes de diagnóstico mostram modelos corretamente especificados.

**Palavras-chave:** sanções, comércio internacional, Brent





## **Abstract**

The impact of the sanctions imposed by the Western countries on Russia since March 2014, given their influence on the economy of Russia and other countries, has been the subject of much interest and discussion. The sanctions have an impact on international trade, economic stability and relationship between the countries. This thesis estimates the influence of sanctions on the economy of Russia resorting to multiple regression analysis. I find that, although, the sanctions affected heavily the Russian economy, the relationship between the explanatory variables in Russian exports and imports did not change due to the sanctions. I also find compelling statistical evidence that the external trade of Russia strongly depends on the Brent oil price. Diagnostic tests exhibit quite good model fits.

**Keywords:** sanctions, international trade, Brent

**JEL Classification:** F14, F31, F41, C31



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## 1. Introduction

Following the conflict between Russia and Ukraine that started in March 2014, many Western countries, including the European Union and the USA, imposed sanctions against Russian individuals and companies, and later against specific sectors. The sanctions had a strong effect on the Russian economy, namely the ruble fell heavily, interest rates skyrocketed, and companies with foreign currency liabilities faced serious financing problems.

Dong and Li (2018) distinguish three rounds of sanctions. At the very beginning, the USA and the EU used restrictive measures, mainly asset freezes and visa bans on selected individuals. In the second round the measures aimed to increase Russia's political isolation, as well as the economic costs to Russia in important areas of economy, such as import bans on Russia's energy and defense sectors, embargo on the import and export of arms, exports bans on certain energy-related equipment and technology to Russia, and financial sanctions. In the third round, starting in July 2014, the USA extended its transactions ban to two major Russian energy firms and two banks, while EU countries took more tighten sanctions against Russia. Russia's counter sanctions, starting during the summer 2014, include imports ban on agricultural products, used cars, clothes and consumer products from countries, which originated sanctions.

Provided the actuality of the topic and the large geopolitical role Russia plays in the world, this thesis aims to investigate the impacts of sanctions on the economy of the Russian Federation, in particular its external trade. The objectives of the thesis are the following. First, to understand the origin, timing and the effects of sanctions. Second, to examine the influence of the sanctions on variables representing different dimensions of Russia's external trade.

To carry out this study, after a statistical analysis of the data, I rely on the methodology of multiple linear regression. The dependent variables are chosen to represent external trade, namely, total exports and imports, oil, oil products, gas, and other exports, as well as the RUB/USD nominal exchange rate. As regressors, I use different macroeconomic variables that may explain changes in Russian trade dynamics.

I need to deal with a couple of challenges. First, some explanatory variables may be strongly correlated, which may lead to a multicollinearity problem. Having this in mind, I test multicollinearity in each model to avoid bias estimates. Second, the imposition of sanctions coincided with a dramatic oil price drop, which was unrelated to the sanctions against Russia. This is important since oil and gas represent about 70% of Russian goods exports, thus, a severe fall in the oil price is likely to have strong negative effects on the Russian economy. I tried to

disentangle these two events by introducing the oil price in the regression, joined with other explanatory variables.

My main findings are the following. First, although the sanctions had a strong impact on the external trade of Russia, I do not find compelling evidence that the relationship between measures of trade and the regressors changed due to the sanctions. Second, the financial crisis of 2008-2009 induces some significant correlations between variables that are specific for the crisis period and not for the full sample. Hence, I re-estimate the model for a shorter sample period starting after the financial crisis to verify whether the observed effects are attributed to the crisis or they apply to the entire sample. Third, the estimated models exhibit quite good model fit and diagnostic tests do not show any misspecification.

The rest of the thesis is organized as follows. Chapter 2 provides some description on the literature on the economic and financial impacts of sanctions. Chapter 3 is dedicated to give some overview about the Russian economy. Chapter 4 describes the sanctions against Russia and the Russian counter-sanctions in detail. The data are presented in Chapter 5 joint with a preliminary statistical analysis. Chapter 6 contains the econometric model and the estimation approach. The results and interpretations are presented in Chapter 7 and robustness tests are carried out in Chapter 8. Finally, Chapter 9 concludes.

## 2. Literature Review

There is a relatively big literature on the economic effects of the sanctions in general, but there are only a handful of papers that study the impacts of sanctions against Russia.

Caruso (2003) estimates the impact of economic sanctions on international trade between the USA and 49 target countries over the period 1960-2000. The results show that extensive and comprehensive sanctions have a large negative impact on bilateral trade, while this is not the case for limited and moderate sanctions.

Bulatova and Abelguzin (2015) focus on the positive and negative consequences of the introduction of sanctions against Russia. The negative effects include: limited access of banks to cheap credit resources, high-technology export limitations to Russia, higher inflation rate, foreign investments slowdown into Russia (75% of which are from the countries of EU), ruble devaluation, oil and gas profits reduction, as well as a decrease of the income of the population, resulting in a drop of demand. As regards positive effects, they are: large-scale campaign for import substitution of sanctioned goods, unitary national payment system, created after VISA and MasterCard terminated the service of some Russian banks' cards, withdrawal of the Russian savings from European and American banks and transfer to Chinese banks, formation of the Eurasian Economic Union and its common financial market, and development of trade with Asian, African and Latin American countries.

As for Meshkova, Vostrikova and Milyushenko (2018), the study is directed to a policy of import substitution, which is a variation of protectionism, and its impact on the economy of the sender-country and targeted-country.

Gurvich and Prilepskiy (2015) examine the impacts of sanctions on financial account and find that sanctions affect sanctioned state-controlled banks, as well as oil and gas companies, by seriously cutting foreign funding. They also report indirect effects on non-sanctioned companies by reducing foreign investments and causing funding conditions to worsen. Their estimated effect of sanctions on GDP is  $-2.4\%$  by 2017.

Dong and Li (2018) find that sanction and counter-sanction measures among the USA, the EU and Russia definitely influences all sanction-involved countries, but benefit all non-involved countries, and the influence of sanctions on different countries are different. The EU sanctions have stronger effects on Russia's economy than those of the USA. They also reveal that soft sanctions have less influence than hard sanctions.

Dreger, Fidrmuc, Kholodilin and Ulbricht (2016) conclude that the economy of Russia is heavily exposed to exchange rate fluctuations because of its dependence on fuel exports. Also,

as the ruble strongly depreciated against US dollar in January 2014, when the conflict between Russia and Ukraine began, and they find that the heavy oil price decline are responsible for that.

Kholodilin and Netšunajev (2018) investigate the impact of sanctions on the Russian and euro area economies at the aggregate level, and whether sanctions imposed on Russia are effective in terms of GDP growth and whether these effects, if exist, can be distinguished from the impact of falling oil prices. They conclude that the sanctions appear to have a very small, if any, effect on the growth rate of the economy of Russia, as well as the effect of sanctions on the European economy is also negligible.

Tyll, Pernica and Arltová (2018) focus on the capital outflow from Russia and the strong relationship between the oil price and the exchange rate of ruble. The authors also focus on the dependence of Russia on imports in many sectors, and they conclude that the Russian economic situation hinges on its dependence on oil exports and the market price on oil.

Bali (2018) uses a country structural vector autoregressive (CSVAR) model to study the economic growth effects of anti-Russian sanctions on the euro area economies (19 countries) and on the six biggest trading partners of Russia jointly and also separately. Results witness that Russia is the most impacted by sanctions with a quarter-on-quarter GDP growth decrease of 3.25% after 3 quarters. European economies are also negatively affected by sanctions, even though the impact is much weaker: -0.075% for Finland, -0.025% for France, -0.0125% for Germany, -0.012% for Italy, and -0.063% for Poland.

Pestova and Mamonov (2019) speak about sanctions that caused a decrease in the amount of outstanding Russian corporate external debt, which occurred during an episode of falling oil. To the opinion of the authors, declining oil prices alone do not explain the depth of economic crisis in Russia, the effect is modest, yet significant, for most of the variables discussed. The impact of sanctions on GDP growth has large uncertainty, over two-thirds of the density lies in the negative area.

Gros and Mustilli (2015) show that in spite of the fact that the sanctions against Russia had a strong negative impact on trade (exports to Russia fell by 50%), and thus potentially jobs in EU countries involved in trade with Russia, the lost exports have been negligible.

The empirical analysis of Crozet and Hinz (2016), on the contrary, finds strong impact of the conflict on Western exports to the sanctioned country Russia and comes to conclusion that EU countries experience 76.7% of trade loss overall. The disruption of the trade finance provision services played an important role for the decline in exports as well.



### 3. An overview of the Russian economy

Russia is situated in the north of Euroasia and is the largest country in the world in terms of area. Given Russia's size, military force, and history, it is a superpower with an enormous geopolitical role that cannot be ignored.

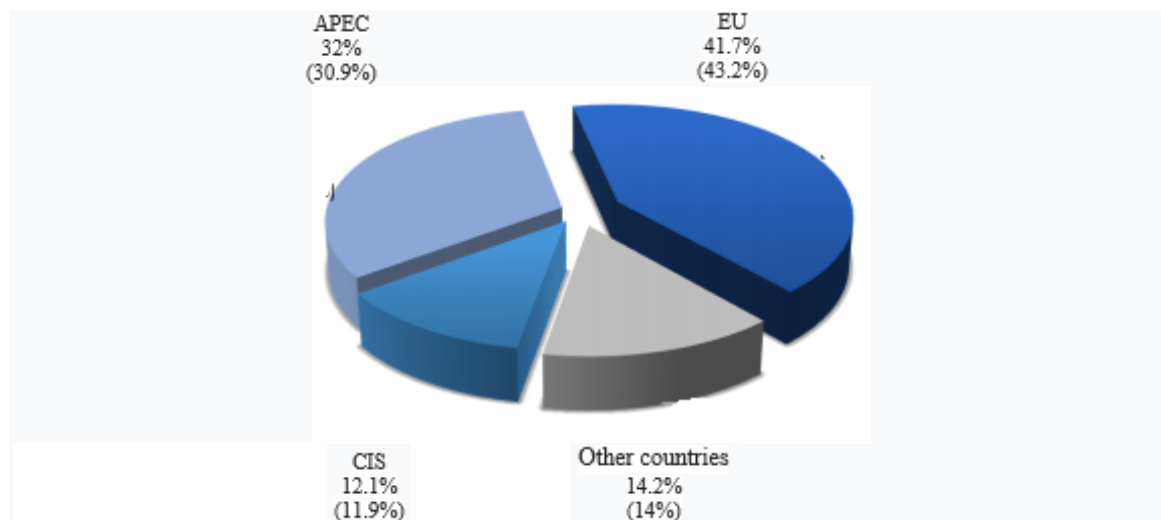
Russia is a member of the Council of Europe, the Organization for Security and Cooperation in Europe (OSCE), the Asia-Pacific Economic Cooperation (APEC) and joined the World Trade Organization (WTO) in 2012, and trade relations between the country and the EU have been aligned by WTO multilateral rules. Russia is also a member of the G20, the leading member of the Commonwealth of Independent States (CIS) and of the Eurasian Economic Union (EAEU).

The country has 85 federal subjects and 146.7 million of inhabitants and its economy is the eleventh largest in the world by nominal GDP (\$1.657 trillion, \$11,305 per capita) and the sixth by PPP (\$4.519 trillion, \$30,819 per capita), as of the estimated data for 2020. The Moscow region contributes the most to the GDP of the country, thus the economic wealth is not evenly distributed. The average monthly accrued wages of employees in June 2020 is 52,123 Rubles, which is \$752.24 (as of average for June 2020 \$/RUB=69.29). Unemployment rate in Russia, as of July 2020, is 6.3%. The official proportion of the middle class is about 25%.

Russia possesses extensive energy and mineral resources: oil and natural gas, timber, titanium, copper, diamonds, lead, zinc, nickel, mercury and many others. Thanks to its dual continentality, Russia is also a major supplier of energy products for all over the world and, according to the results of 2019, foreign trade turnover amounted to \$666.6 billion, having decreased by only 3% compared to 2018.

Russia is a dynamic market for EU goods and services and is the EU's fifth most important trading partner and the EU is the largest trading partner for Russia, representing 41.7% of Russian foreign trade turnover or \$277.8 billion in 2019. Comparing with 2018 the trade with the EU decreased by 5.6%, namely, imports decreased by 0.8% and exports by 7.8%. The second largest country group in terms of foreign trade turnover is the countries of the Asia-Pacific Economic Cooperation (APEC) (31.8% of Russian foreign trade or \$212.2 billion) with a general decrease by 0.5%: exports decreased by 4.3% and imports increased by 4.1%. The third largest group is the Commonwealth of Independent States (CIS), an intergovernmental organization of post-Soviet republics in Euroasia, the volume of trade, as well, decreased with these countries, namely by 1.3% to \$80.4 billion (see Figure 3.1.).

**Figure 3.1. The structure of foreign trade turnover in 2019 (data of 2018), according to customs statistics.**



Source: The Ministry of the Economic Development of Russian Federation. [http://www.ved.gov.ru/monitoring/foreign\\_trade\\_statistics/monthly\\_trade\\_russia/](http://www.ved.gov.ru/monitoring/foreign_trade_statistics/monthly_trade_russia/)

As for the Observatory of Economic Complexity (OEC) accessed on October 20, 2020, in 2018 the top Russia's exports were:

- Crude petroleum (\$134 billion),
- Refined petroleum (\$77.5 billion),
- Petroleum gas (\$27.4 billion),
- Coal briquettes (\$18.9 billion),
- Wheat (\$10.7 billion).

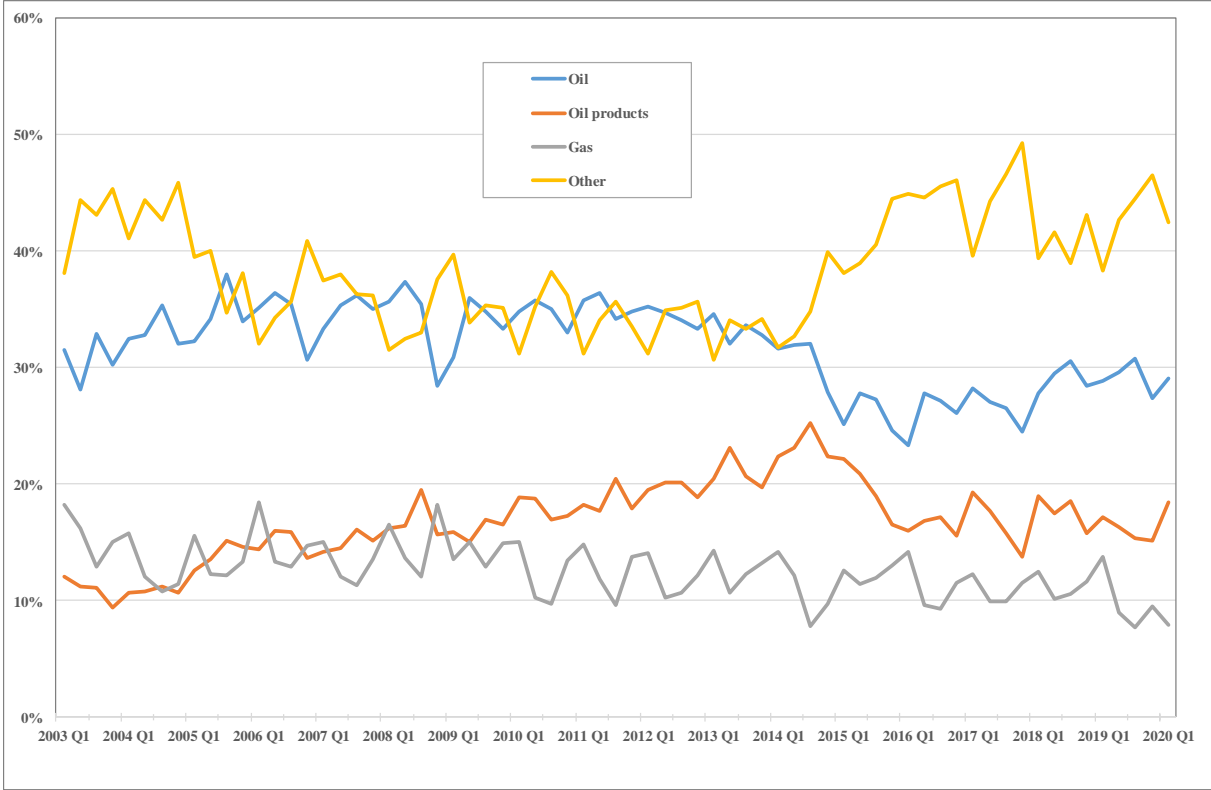
The proportions of Russia's main export products relatively to total exports are plotted in Figure 3.2.

EU is also one of the greatest importers for Russia, namely 4.1% of global exports of EU went to Russia and represents 35% of the country's imports in 2019, compared to 11.8% of global exports of EU that represented 39% in 2012. As for exports from Russia, 42% of them had the destination of EU in 2019, which is 8 percentage points less than in 2012.

According to the Ministry of Economic Development, in 2019 Russia's exports destinations were: China (\$57 billion), the Netherlands (\$45 billion), Germany (\$28 billion), Turkey (\$21 billion), Byelorussia (\$20.5 billion) and Russia's imports were mostly from China

(\$54 billion), Germany (\$25 billion), the USA and Bielorrussia (both at about \$13 billion) and Italy (\$11 billion).

**Figure 3.2. Proportions of main export products relative to total**



Source: Central Bank of Russia (Annual report of the Bank of Russia for 2019) and calculations by the author.

Western sanctions on Russia were introduced in 2014 in response to Russia-Ukraine conflict and had a negative effect on bilateral trade. The trade between EU and Russia dropped 43% between 2012 and 2016, namely from €322 billion in 2012 to €183 billion. Since 2016 the trade between EU has been gradually recovering and in 2019, as of the Ministry of Economic Development, export of goods represented \$422.8 billion and was 6% lower than in 2018, and this cut had to do with the lower exports of energy products (the reason is the decline of export prices), wheat, steel, semi-finished products, and diamonds. The imports of Russia in 2019 represented the amount of \$243.8 billion, which was 2.2% above that of 2018, and was due to the growth of imports of medicines and vaccines.

As for the International Monetary Fund (IMF) mission, led by James Roaf who visited Russia in November 13-20, 2019, the conclusion and statement of Mr. Roaf was:

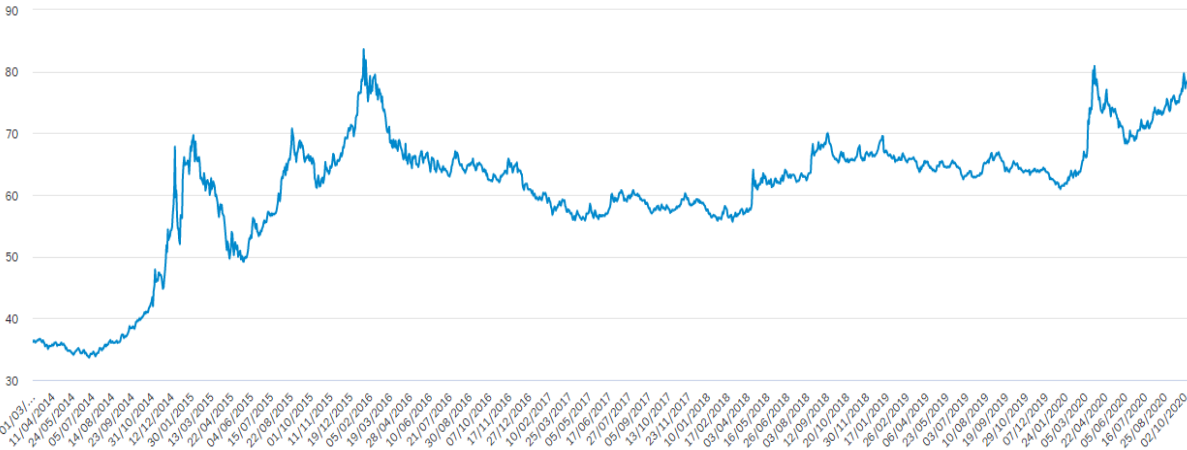
“... international sanctions which have pervasive effects in adding to business uncertainty, holding back both foreign and domestic investment, and reducing Russia’s international market integration. Taking these factors together, the medium-term outlook for the economy remains subdued, with growth projected at or below 2 percent through the next few years.”

The Minister of Finance of Russia A. G. Siluanov (January 2015) revealed the calculation made by the Ministry of Finance of the Russian Federation: \$40—50 billion of the \$200 billion loss was the result of sanctions imposed by the Western countries, and the fall of oil prices caused the rest of the loss.

The economic sanctions, together with a decrease in the dollar flow from oil production equipment imports, led to a strong depreciation of the ruble. The Central Bank of Russia took the decision to increase the key interest rate from 10.5% to 17% in three steps in the last quarter of 2015 to mitigate the volatility, which caused a strong increase of borrowing costs. This led to instability of companies and an increase of unemployment, more expensive consumers’ credits and the increase of prices of imported products and services. The fall of the oil prices as well as economic sanctions slowed down the growth of GDP of Russia and in 2014 it turned into negative.

The Russian ruble became so undervalued after 2014 that in 2019, the currency was the most undervalued currency (by 64.5%) worldwide (as of Big Mac Index Table) and the official exchange rate was \$/RUB=77.25, €/RUB=91.54 as of October 21, 2020. The graph of the ruble exchange rate can be seen in Figure 3.2.

**Figure 3.2. The fall of ruble since March 2014. The scale is the price in \$.**



Source: Central Bank of Russia

Nevertheless, Russia has to resort to mitigation of the negative effects of the sanctions and some are worth mentioning. First, campaign for import substitution of sanctioned goods, namely, Russian authorities provide a wide range of support to agricultural companies, especially small and medium size. Second, development of innovation activity and technology. Third, unitary national payment system. Fourth, but not the last, development of trade with Asian, African and Latin American countries.



#### **4. The imposition of sanctions by the EU and the USA**

Since March 2014 the EU and the USA have imposed a number of sanctions due to Russia's involvement in the Ukraine crisis. The sanctions have been introduced in three phases and can be divided into economic sanctions and sanctions against individuals and entities.

The economic sanctions directed to Russia limit access to the capital markets of the EU and the USA, and influence on oil, aircraft industry, and defence, and can be classified into the following (here I follow the classification of Infographic, 2020):

- Sanctions against various sectors of the Russian economy: finance, energy, defence, and dual-use goods. These are in place until 31/01/2021 and are renewed every 6 months.
- Sanctions against individuals and entities that include the freeze of assets in the EU and the USA of those sanctioned, and travel restrictions to the EU and the USA for the sanctioned. These are valid until 15/09/2020 and are renewed every 6 months. The list of the sanctioned include 175 persons and 44 entities.

The flow of the sanctions began on the 17 March 2014 as a result of Foreign Affairs Council meeting. EU ministers introduced the first measures against 21 officials responsible for actions threatening Ukraine's territorial integrity. The measures included a travel ban and a freeze of assets of these 21 officials within the EU.

Diplomatic relations and economic cooperation between the countries involved have been also impaired and include the suspension of regular EU and Russia summits, exclusion of Russia from G8 meetings and no new loans to Russia by the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD).

The further sanctions are targeted to principal sectors of Russian economy and include financial, energy, and defence sectors. Furthermore, the area of dual-use goods imports was also targeted, and an exports ban on certain goods and technologies was imposed, as well as investments, export and import of goods and services in Crimea. The restrictions focused on individuals and commercial entities of the main competitive sectors of the Russian economy: oil, gas, and banking. The sanctions prohibit the exports of goods and technologies for oil fields exploration and oil refining to Russia, and also contain a ban on investment in Russia's energy sectors.

The sanctions are mainly extended by the European Council every six months and by the US Department of the Treasury every year, and are in force up to present.

Since March 20, 2014 Russia imposed countersanctions in response, namely:

- termination or suspension of international cooperation of Russia and Russian legal entities with such countries and organizations, in sectors to be determined by decision of the President,

- prohibition or restriction on imports from such countries,
- exports from Russia to such countries,
- participation in Russian privatization of organizations or citizens of such countries,
- and “other measures” by decision of the President.

To the great extent Russian countersanctions include food imports ban, introduced on August 8, 2014 and Russian countersanctions are renewed every year, and are in force up to now.

The Russian government had to push import substitution policies to build up domestic agricultural production and make the country self-sufficient in food products.

For the detailed list of EU and US sanctions, see Appendix A. The list of Russian countersanctions are presented in Appendix B. I used the following sources to find the information regarding the sanctions: Ministry of Economics of Russia, Council of the European Union, Federal Customs Service of Russia, Independent Monitoring of Policies that Affect World Commerce, U.S. Department of State, Federal State Statistics Service of Russia, Eurostat, and the Central Bank of the Russian Federation.



## 5. Data

In this thesis, quantitative data are used, in particular, balance of payments statistics, including exports and imports of goods, and other relevant macroeconomic variables. The data are from the Central Bank of Russia and Datastream, and are at the quarterly frequency. Although it will be better to use seasonally adjusted series to obtain smoother data, I was only able to find not seasonally adjusted series.

I consider the following variables as possible dependent variables: total exports, total imports, oil exports, oil products exports, gas exports, and other exports, as well as the ruble/US dollar nominal exchange rate, which was heavily affected after the sanctions were imposed. The time series of these variables are plotted in levels in Figure 5.1 and in log difference in Figure 5.2.

The possible regressors to explain these dependent variables are the following:

- GDP. With this variable there is a possible endogeneity problem because exports and GDP affect each other simultaneously. I expect positive relationship between these two variables, because higher exports lead to higher GDP and vice versa.
- Real Effective Exchange Rate (REER) is an important indicator of the country's competitiveness, so it must have an influence on the balance of payments. However, the endogeneity problem can also arise with this variable, because international trade affects the exchange rate. I expect negative relationship with exports and positive relationship with imports.
- MOEX, since most of the Russian companies in the stock exchange are big exporters/importers (e.g. Rosneft, LUKOIL, Norilsk Nickel, Yandex N.V., among others), the market valuation of these firms may affect their export/import performance. But again, endogeneity may be an issue, since lower exports may decrease the valuation of the firm. The causation relation from MOEX to exports is not clear, but, if there is any, it should be positive.
- Bank loans to households and companies in rubles. Higher loans to companies may lead to higher exports, as these loans may be taken for investment purposes for example. That is why I expect positive relation between bank loans and exports.

**Figure 5.1. Time series of levels of the dependent variables and government bond yields**



Notes: the figure plots the time series of dependent variables in levels. The sample period is between 2003 Q1 and 2020 Q1, and the data is quarterly. The vertical red line indicates the date of the first sanctions against Russia.

**Figure 5.2. Time series of log differences of the dependent variables and government bond yields**



Notes: the figure plots the time series of dependent variables in log differences. The sample period is between 2003 Q1 and 2020 Q1, and the data is quarterly. The vertical red line indicates the date of the first sanctions against Russia.

- 10-year government bond yields, a benchmark interest rate in Russia. Interest rates may affect exports/imports via the nominal exchange rate. Higher interest rates typically lead to a stronger currency which in turn makes exports (imports) less (more) competitive. Hence, a negative (positive) impact is expected. I do not expect the endogeneity problem to arise because it is not clear causal relationship from exports to government bond yields.

- Brent oil price. As Russia is one of the biggest oil/gas exporter (as the previous section shows), its economy is dependent, to a great extent, on the oil price. Although for Russia the benchmark oil price is the Urals, I was unable to find free historical data. However, charts available online provide compelling evidence that Brent and Urals co-move very strongly, so Brent must be a good choice as a regressor. Since there is no international benchmark gas price available, I cannot use any proxy for it. If the Brent oil price goes up, an increase in exports is most likely, so a positive relationship is expected.

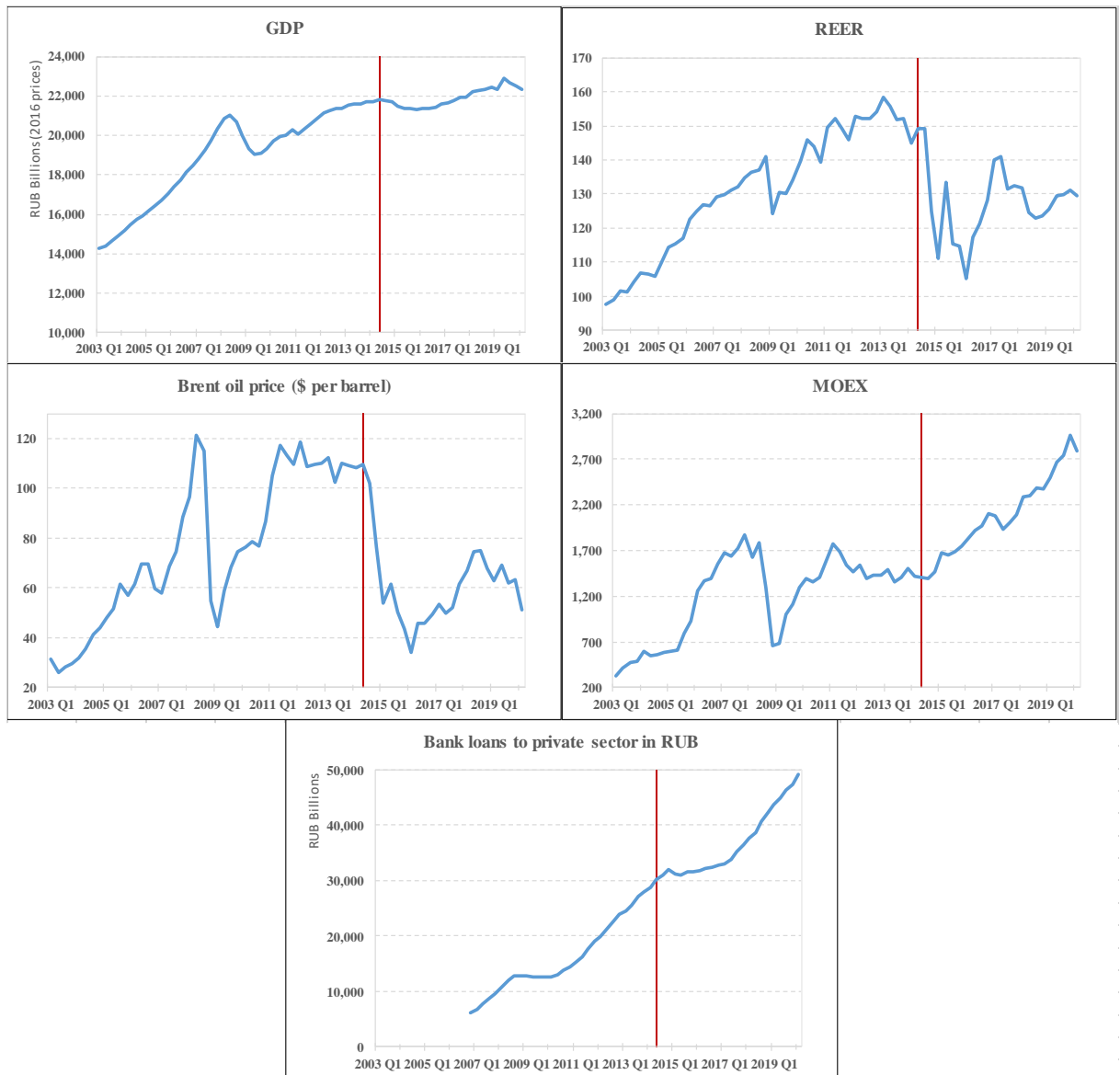
The plots and log differences of the above variables can be seen in seen in Figures 5.3 and 5.4.

### 5.1 Preliminary analysis of the data.

Some of these regressors may be weakly or strongly correlated which may lead to multicollinearity in the regressions, therefore, in Figure 5.5, I present the scatterplots of some of the regressors and total exports and imports.

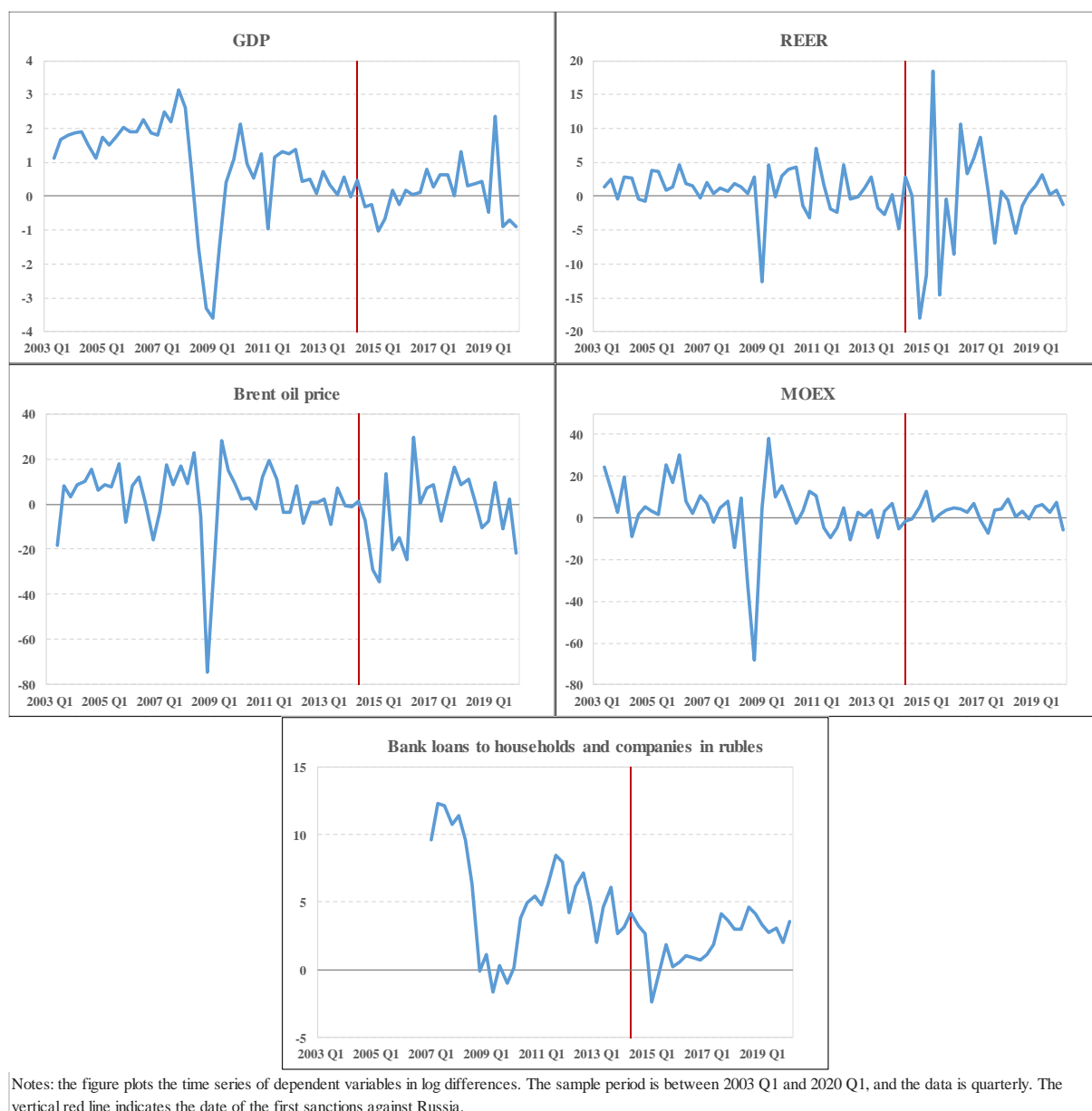
The negative correlations between the ruble exchange rate and Brent, as well as MOEX and Brent, are worth mentioning. The causality is always from Brent to the other variables and not the other way around, as the Brent is the international benchmark price used by the Organisation of Petroleum Exporting Countries (OPEC). Such a correlation between RUB/USD exchange rate and Brent may be explained by the de-dollarization of the Russian economy. Several countries decided to lower their dependence on US dollar and started to diversify their international reserves (The Financial Times, 2018). Russia accelerated de-dollarization in 2014 as a response to sanctions. As the global trade of oil is denominated in US dollars, Russia receives its payments in dollars. Since the de-dollarization has began, Russia has been exchanging US dollars into rubles to a greater extent. As a consequence the ruble has appreciated in real terms. As regards MOEX and Brent, the causality is simpler: higher Brent implies higher revenues and higher market valuation for the exporting companies.

**Figure 5.3. Time series of levels of the explanatory variables**



Notes: the figure plots the time series of regressors in levels. The sample period is between 2003 Q1 and 2020 Q1, and the data is quarterly. The vertical red line indicates the date of the first sanctions against Russia.

**Figure 5.4. Time series of log differences of the explanatory variables**

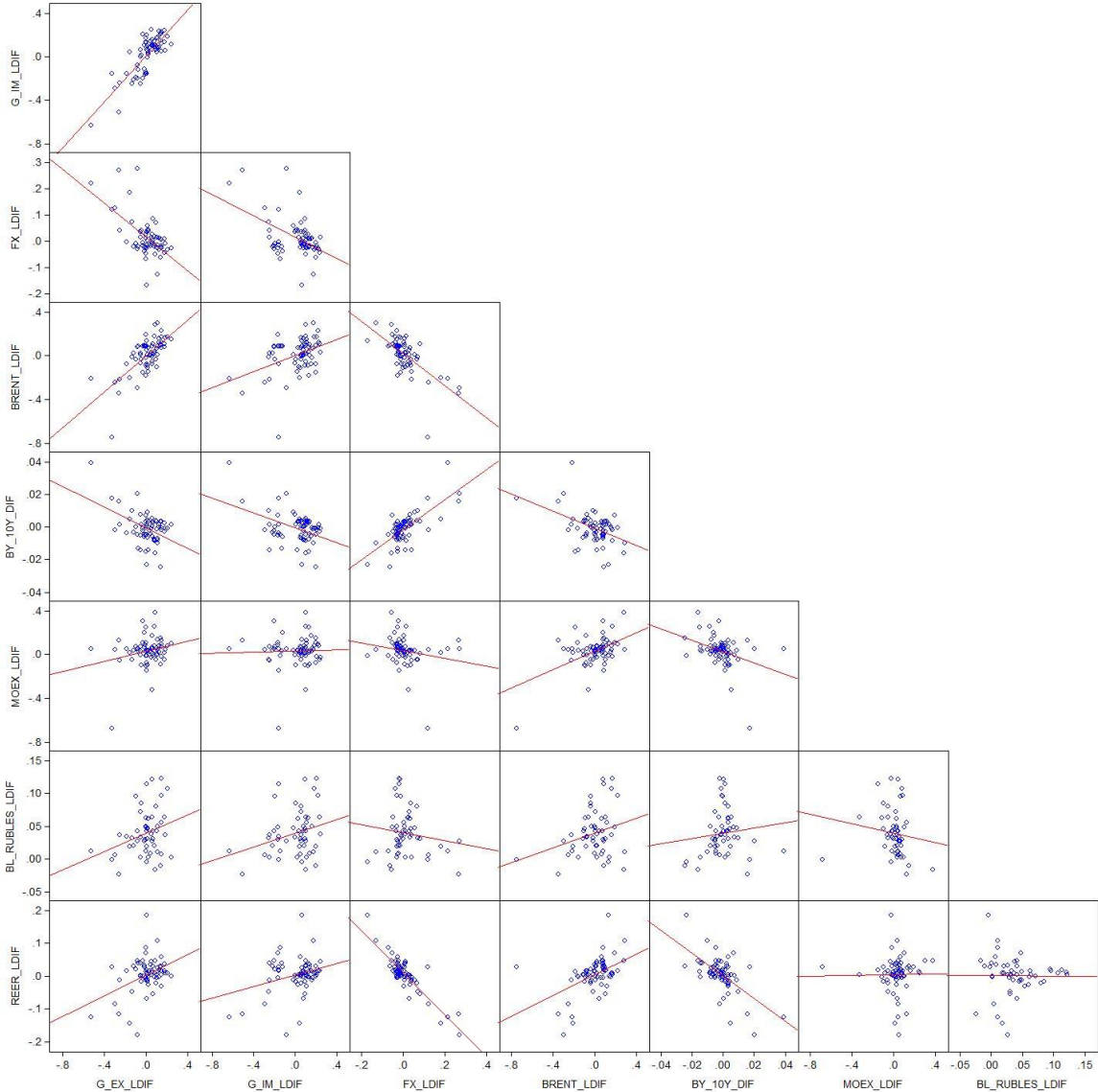


As for the negative correlation between 10-year government bond yields and Brent, it may again be explained by the de-dollarization. Part of export revenues, instead of going into US dollar assets, has flown into the Russian government bond market. The extra demand for Russian government bonds pushes up their prices, thereby lowering the yields.

There is a seemingly puzzling correlation between bond yields and the nominal exchange rate. As explained above, standard theory suggests a negative relationship, namely higher

interest rates lead to a stronger currency. However, the chart shows a clear and strong positive correlation (0.72).

**Figure 5.5. Scatterplots of total exports and imports with some regressors**



Notes: the figure contains scatterplots between the log differences of selected variables, which are the following. G\_EX\_LDIF = total exports, G\_IM\_LDIF = total imports, FX\_LDIF = RUB/USD nominal exchange rate, BRENT\_LDIF = Brent, BY\_10Y\_DIF = 10-year government bond yields, MOEX\_LDIF = MOEX, BL\_RUBLES\_LDIF = bank loans to households and companies in rubles.

Although this is inconsistent with the theory, a possible explanation can be that the positive co-movements, likely to be caused by some underlying factor, which are mostly pronounced during the financial crisis of 2008-2009 and the beginning of sanctions from 2014, as it is visible in Figure 5.1. Therefore, this correlation does not reflect a causal relationship but rather a common

factor that drives both variables. Given the above analysis, this common factor is likely to be Brent. The same reasoning applies to the relationship between bond yields and nominal exchange rate.

Provided the sometimes strong correlations between regressors, in the regression analysis I need to be careful about possible multicollinearity and avoid to include them jointly.

## 5.2 Stationarity analysis

Before running regressions with these data I need to verify the stationarity of both the dependent variables and the regressors to avoid spurious regression. Hence, I carried the Augmented Dickey-Fuller test for all variables to verify the presence of a unit root. The results are shown in Appendix C.

It seems obvious from the table that the levels of almost all variables seem to be non-stationary during the sample period as the ADF fails to reject the null hypothesis of a unit root. There are three exceptions: Brent, gas exports and 10-year government bond yields. As it is visible in Figure 5.1, these three variables do not seem to exhibit a trend. Gas exports show an increasing trend until the beginning of the sanctions and then they drop substantially and this may cause the rejection of the unit root. The series of bond yields present two very high picks during the financial crisis of 2008-2009 and the beginning of sanctions, but in both cases, the bond market recovered making the series look like more stationary. As regards Brent, in addition to the financial crisis period, a big drop is observed in 2014. However, this is unrelated to sanctions, but is caused by global factors (China's demand lowered, but OPEC kept the supply high, which pushed down the oil price).

The results for log differences provide a very clear evidence on stationarity in the series, except for GDP and ruble loans. In the former case, the non-rejection of the null hypothesis is likely to be due to the big drop of economic activity during the financial crisis. Regarding ruble loans, again the crisis must have influenced the test results, in addition to the short sample period.

It is also reasonable to think that what matters is not the level of the variables but how they change. Thus, regardless of the unit-root test results, I resorted to the percentage changes in the variables and not their levels.



## 6. Methodology

The research context is the country under investigation – Russia – and the sector to study is external trade. Interestingly, only a few studies focused on this sector, although external trade was one of the most affected areas of the economy by sanctions.

As regards research design, I will study the impact of sanctions and other explanatory variables on external trade via econometric methods.

My research focus is how exports and imports of goods were affected by the sanctions. Since these effects are captured by explanatory variables, and I want to explain which are the most relevant in forecasting the dependent variable (external trade in this case), multiple linear regression seems to be the most adequate for that purpose.

In order to study the impact of sanctions the sample period starts from 2003Q2, 11 years before the sanctions were imposed, and then I looked at what happened after the sanctions. Given the characteristics of the data, the econometric model is essentially a time-series regression:

$$y_t = \alpha + \delta'X_t + \beta_c D_t^c + \beta_s D_t^s + \gamma'X_t D_t^s + \varepsilon_t \quad (6.1)$$

where  $y_t$  denotes the dependent variable;  $X_t$  stands for a vector of regressors,  $D_t^c$  denotes the crisis dummy that takes the value 1 between and including 2008 Q3 and 2009 Q2, and  $D_t^s$  is the sanctions dummy taking the value 1 after and including 2014 Q2. I also include an interaction term of the independent variables with the sanctions dummy. This way I allow different intercept and slope parameters before and after the sanctions were imposed.

To illustrate, this model implies that the intercept of the regression before the sanctions is  $\alpha$  and after the sanctions it becomes  $\alpha + \beta_s$ . Regarding the coefficients of the regressors, before 2014 Q2 (sanctions) is  $\delta$  and after 2014 Q2 (sanctions) is  $\delta + \gamma$ . Hence it is important to verify the significance of the parameters  $\beta_s$  and  $\gamma$ .

My estimation strategy is the following. First, I only include the crisis and sanctions dummies. Then, I add the regressors one by one and check whether they improve the fit of the model (I looked at the R-squared and the log-likelihood value). As some regressors may be endogenous, I include them with the lagged value into the regression. If the regressor is not significant and does not contribute to model fit, I drop it.

After estimating the model I have to run some robustness tests to check the model specification. I test for heteroscedasticity and serial correlation in the residuals and I adjust the

standard errors accordingly. Finally, since some regressors are strongly correlated, I always check multicollinearity in the model.

## 7. Results

This section presents the estimation results and interprets the findings. I provide analysis for each dependent variable separately. The estimation results are presented in Table 7.1.

### 7.1 RUB/USD nominal exchange rate

In the model of the RUB/USD nominal exchange rate I find three significant variables: Brent, bond yields and MOEX. Note that MOEX was introduced with a lag because of potential endogeneity problems, namely that the exchange rate may influence the profitability of exporters and importers, constituents of MOEX.

The strongest effect is exerted by bond yields, although it has to be noted that changes in bond yields are much smaller than those in other variables (see the axis of the variables in Figure 5.2.). The impact is positive in line with the correlation analysis (see Chapter 5), reflecting empirical observation that especially during the crisis and after the sanctions the two variables moved in the same direction. As explained earlier, these co-movements may be the consequence of a common factor, possibly Brent. However, bond yields appear to have some additional explanatory power, since they are significant in addition to Brent.

Changes in the oil price have a negative impact on the nominal exchange rate. In Chapter 5, I argued that this negative relationship may be explained by the de-dollarization strategy of the Russian government. The fact that Brent has an even stronger negative effect on the RUB/USD exchange rate, gives an additional support to this hypothesis. Nevertheless, we cannot forget that the sharp drop in the Brent oil price in 2014 is very likely to be unrelated with sanctions against Russia, so the observed strong effect must exaggerate the real effect.

MOEX also has a negative, but not so accentuated effect on the nominal exchange rate. This relationship may be explained by the following: a higher MOEX may attract more investors and that requires rubles. Together with the de-dollarization, this may cause the appreciation in the nominal exchange rate. There is no statistical evidence on the change of MOEX's impact on ruble's exchange rate due to the sanctions.

Neither the crisis dummy, nor the sanctions dummy is statistically significant, suggesting that the model captures well the exchange rate dynamics during these periods.

Table 7.1. Estimation results

	RUB/USD		Total exports		Oil exports		Oil products exports		Gas exports		Other exports		Imports	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
<b>Brent</b>	-0.0893	0.0164	0.3563	0.0000	0.9124	0.0000	0.3980	0.0018	0.6876	0.0159	0.3662	0.0000	0.1208	0.0914
<b>10-year bond yields</b>	2.2959	0.0003												
<b>10-year bond yields<sub>-1</sub></b>					-2.1763	0.0003					-1.7417	0.1134	0.6993	0.5209
<b>MOEX<sub>-1</sub></b>	-0.0930	0.0016	0.4341	0.0000			0.6557	0.0000					0.2725	0.0001
<b>Ruble loans</b>			0.6777	0.1035			1.0648	0.0454						
<b>RUB/USD<sub>-1</sub></b>											-0.7793	0.0146		
<b>Crisis dummy</b>	0.0053	0.4634	-0.0030	0.9360	0.0130	0.2293	0.0576	0.2963	-3.7606	0.2577	-0.0003	0.9926	-14.5856	0.0001
<b>Sanctions dummy</b>	0.0101	0.3741	0.0320	0.4598	0.0104	0.1401	-0.0105	0.8566	-2.2658	0.3192	0.0170	0.2847	-3.8179	0.1240
<b>Brent * sanctions</b>	-0.2587	0.0023	0.1199	0.2526	0.0568	0.4383	0.2492	0.1706	-0.0771	0.8009	-0.1388	0.0990	0.1556	0.1498
<b>10-year bond yields * sanctions</b>	3.7806	0.0168												
<b>10-year bond yields<sub>-1</sub> * sanctions</b>					3.8466	0.0025								
<b>MOEX<sub>-1</sub> * sanctions</b>	0.1156	0.6669	-0.3258	0.2655			-0.2341	0.6663			5.5520	0.0003	-3.8027	0.0197
<b>Ruble loans * sanctions</b>			-0.4228	0.6328			0.7559	0.5866					-0.4753	0.0919
<b>RUB/USD<sub>-1</sub> * sanctions</b>											0.3022	0.3601		
<b>No. Observations</b>	67		49		63		53		65		63		63	
<b>R<sup>2</sup></b>	0.8298		0.8618		0.8929		0.7515		0.5309		0.8435		0.9171	

Notes: the table contains the estimation results of linear regressions for the dependent variables given in the columns. The sample period is 2003 Q1 - 2020 Q1. The p-values are calculated by taking into account the results of residual tests. In case the residuals show heteroscedasticity, White standard errors are calculated, while in case of serial correlation, Newey-West standard errors are used.

The overall fit of the model is quite good, the variables explain around 83% of the variation of exchange rate changes, and diagnostic tests do not show heteroscedasticity and autocorrelation in the residuals. Furthermore, formal tests for multicollinearity (variance inflation factors and coefficient variance decomposition) suggest that, despite possible correlation between regressors, the results are robust.

## 7.2 Total exports

In the model for total exports two variables are significant: Brent and MOEX. The latter is included with a lagged value because exports are likely to affect companies' valuation, thus an endogeneity problem may arise.

It is pretty obvious that total exports are positively and strongly affected by Brent (see Table 7.1). Regarding its economic effect, the estimated parameter suggests that if Brent increases by 1%, then Russian exports would increase around 0.36%. This is not surprising as crude oil accounts for a significant share of Russian exports as I explained in Chapter 3. The estimation result shows that the impact of Brent has not changed since the sanctions were imposed.

MOEX also has a positive effect on total exports, even stronger than Brent. One possible explanation is that rising MOEX may reflect a more optimistic view on the Russian economy in general and this improved business confidence may result in a surge in exports. Although after the sanctions I obtained a negative parameter, suggesting a weakening effect, this is not statistically significant, hence the impact of MOEX has not changed during the sanctions.

Another significant variable is bank loans to households and companies in rubles, which has a very strong positive impact, although only weakly significant. It is not surprising because more bank loans to the private sector are likely to lead to bigger investment and, thereby, to higher exports. Similarly to Brent and MOEX, this impact has not changed significantly after the imposition of sanctions.

Both the crisis dummy and the sanctions dummy are insignificant, so the intercept of the model does not change during these periods.

The overall model fit is quite good, the variables explain around 86% of the variation of total exports changes, and residual tests do not indicate any misspecification. The robustness of the model is also verified by multicollinearity tests.

### 7.3 Oil exports

The price change of the Brent blend exerts a strong positive effect on oil exports in this model, without any surprise, being a benchmark crude oil price. The estimated parameter of 0.91 indicates that a 1% increase in Brent price leads to an increase of 0.91% in oil exports (see Table 7.1.). There is also compelling statistical evidence that the impact of Brent has not changed after the sanctions were imposed. Although oil exports fell substantially due to the sanctions, Brent also fell for other reasons, and this may be an explanation why its impact has not changed.

Government bond yields are introduced in the model with a lag because of a possible endogeneity problem. Owing to de-dollarization, part of oil export revenues may find their way to the domestic government bond market. A puzzling phenomenon arises with bond yields. Before the sanctions the impact of bond yields is negative and after the sanctions it becomes positive, both highly significant. Since higher bond yields means higher financing costs, this can have a negative effect on oil exports and this is reflected in the negative coefficient before the sanctions. However, the interaction term not only does have a significantly positive coefficient, but it is even higher in magnitude than the negative effect before the sanctions. This indicates a positive relationship between changes in bond yields and changes in oil exports after the sanctions. Looking at the graphs I cannot find a plausible explanation for this, although I tried different model specifications with different variables but this result has remained robust.

Dummies controlling for the crisis and the sanctions are insignificant, so the intercept of the model does not change during these periods.

Similarly to the previous models, the general fit seems to be very good and diagnostic tests do not find any misspecification.

### 7.4 Oil products exports

Regarding the significant explanatory variables and their signs, the results for oil products exports are very similar to those for total exports. Namely, Brent, MOEX, and ruble loans to the private sector are the ones that affect significantly the dependent variable, and their effects appear no to be different before and after the sanctions.

In this model Brent has lower impact than on oil exports. This may be explained by the fact that the prices of oil products are less linked to Brent than Russian crude oil.

Ruble loans to the private sector exert a stronger impact on oil products exports than to crude oil exports. This fact may be explained by the possible different dependence on bank

credit of oil and oil products producers and its subsidiaries. Or this variable may capture the impact of some omitted variable.

As for the other models, the crisis and the sanctions dummies are insignificant.

The general fit (R-squared) seems to be quite good, although worse than for the other models. This may be because of the omission of some relevant variables, perhaps specific to this sector. Diagnostic tests do not find any misspecification.

## 7.5 Gas exports

The most pronounced feature of this model is its relatively low R-squared, meaning that the model explains only about half of the variation of gas exports. The strong seasonality of gas exports (they are always higher in the winter because of the heating) may be responsible for this to a great extent. Unfortunately, I was not able to find seasonally adjusted data for this variable to avoid this problem. Moreover, gas exports may depend on some possibly industry-specific variables that are different from the regressors I use.

In order to tackle the problem of seasonality, I created a dummy variable which takes the value 1 in Q3 in Q4 (winter) and added it to the model. The results show a better model fit and a weakly significant winter dummy verifying the hypothesis of higher gas exports during the winter.

The only significant variable in this model is Brent and its impact does not seem to be different before and after the sanctions were imposed. Although, Brent is a benchmark price for crude oil, it was used for a long time to index gas prices too. It is not the case anymore, but price changes in energy market may have an effect on the price of gas.

Both the crisis and the sanctions dummies are insignificant in this model as well.

The value of 0.53 for R-squared indicates substantially worse model fit than for the other dependent variables, probably because determinants of gas exports are different from the factors that affect the other variables.

## 7.6 Other exports

As Figure 3.2. shows, other exports represent the biggest proportion of Russian exports, especially after sanctions. Even though this category excludes oil and oil products, it still significantly affected by the Brent price (0.37, see Table 7.1.). This impact becomes weaker after the sanctions (0.37-0.14=0.23), probably reflecting the fact that the weight of Russian oil exports reduced in total exports. Brent may also have an indirect effect via the nominal

exchange rate as I showed in Chapter 5. However, the RUB/USD exchange rate also has a direct impact on other exports (-0.78), which remains the same after the sanctions. Since Russian exports are mostly denominated in USD (over 60% according to the CBR, although decreasing) and have high import needs, depreciation of the ruble would mean higher production costs for the exported companies that rely on imports, explaining the negative coefficient estimate.

Regarding government bond yields, the same puzzling result arises as in the case of oil exports. Whereas, before the sanctions the estimated parameter is negative, in line with expectations, after the sanctions it becomes positive. Similarly to oil exports, I cannot find a plausible explanation for such result, although the correlation between changes in other exports and lagged changes in bond yields is slightly negative in the post-sanction period. In any case, this positive correlation can hardly be explained economically and possibly captures the effect of some omitted variable.

This model repeats the pattern of the other models described above, as its crisis and sanctions dummies are insignificant.

The overall model fit is quite good (R-squared is 0.84). Diagnostic tests do not indicate any misspecification.

## 7.7 Total imports

Looking at the log changes of imports in Figure 5.2, a very pronounced feature is the drops in Q1 every year. This is a seasonality factor, which may be attributed to winter months when Russia imports less. To control for this I created a dummy variable with a value 1 in Q1. Not surprisingly, this dummy turned out to be highly significant.

This is the first model where the crisis dummy becomes very significant, implying the huge drop in imports during the 2008-2009 financial crisis. The estimated coefficient of -14.59 suggests an almost 15% fall in imports during the crisis, besides the impacts of other variables.

In the model of total imports three significant variables can be identified: Brent, MOEX and government bond yields. The last two variables are included in the model with a lagged value due to the same endogeneity issues as for the exports variables.

Unlike the case of exports variables, Brent here plays a lesser role which is reflected by the lower estimated coefficient and its weak significance. In addition, its effect does not appear to be different after the sanctions.

MOEX has a highly significant positive effect, which is more than offset by a weakly significant negative coefficient after the sanctions. In the pre-sanctions period, higher market



valuation may have led to higher import purchase needs, thus the positive impact. As regards the post sanction period, as Figure 5.1 shows, imports fell heavily while the stock market did not seem to be affected. The possible explanation may be that owing to the severe depreciation of the ruble, the Russian stock market became cheap which attracted possibly foreign investors. Another reason for the bull market can be that sanctions against Russia banned big Russian investors from Western markets and they chose to invest at home.

The government bond yields only become significant after the sanctions and the impact is negative. There may be two reasons for this. First, higher bond yields mean higher borrowing costs for the private sector, implying lower import demand. Second, as I have shown before, higher interest rates resulted in a weaker ruble, which made imports dearer.

The overall model fit is very good, the variables explain around 92% of the variation of total imports changes. Residual tests do not indicate any misspecification. This model can be considered robust.



## 8. Robustness tests

The 2008-2009 financial crisis was a big blow for the whole world economy, including Russia. Since most of the macroeconomic variables were heavily affected by the crisis, it may be the case that this one-time event blurs the effect of the sanctions. For this reason, I re-estimated all the models for a shorter sample period starting in 2009 Q3 when the economy returned to normal. The estimation results are presented in Table 8.1.

In the model of RUB/USD exchange rate Brent has a stronger effect than in the full sample, but there is no statistical difference between the pre-sanctions and after sanctions impacts. The Brent changed substantially before and during the financial crisis, and the omission of this period may be the responsible for this somewhat different impact. Another different result is that MOEX becomes insignificant in the shorter sample. This is because the biggest fluctuations in MOEX occurred during the crisis. Thus, the impact of MOEX in the full sample is totally attributed to the financial crisis.

Regarding total exports, the qualitative findings of the model for the full and the shorter sample are very similar, both in terms of the values, signs, and the significance of parameters. Therefore, the model seems not to be heavily affected by the financial crisis.

The puzzling result regarding the relationship between bond yields and oil exports, not only remains in the shorter sample, but becomes even more pronounced. The very weak significance of bond yields before the sanctions in the shorter sample may reflect that their effects on oil exports were stronger before and during the financial crisis. Another puzzling result is the significantly positive coefficient of the sanctions dummy. A possible explanation can be that the regressors imply a bigger drop in exports than it actually occurred and this dummy offsets this impact to some extent.

In the model of oil product exports, Brent loses its significance before the sanctions and becomes, albeit weakly, significant in the post-sanctions period. This may suggest that the strong impact of Brent in the full sample comes from the crisis period. In the shorter sample it seems that Brent exerts a stronger influence on oil products exports after the sanctions were imposed than before. Bank loans in rubles depict a similar story. When I ignore the crisis period, their effect turns out to be insignificant indicating that ruble loans to the private sector affected oil products exports mostly before and during the financial crisis.

The model for gas exports does not exhibit any qualitative change. This may be because of the relatively poor model fit with a single regressor and the omission of possibly relevant variables.

Table 8.1. Estimation results for the post-crisis period

	RUB/USD		Total exports		Oil exports		Oil products exports		Gas exports		Other exports		Imports	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
<b>Brent</b>	-0.2785	0.0359	0.4252	0.0001	0.9260	0.0000	0.0734	0.8164	0.7871	0.0366	0.4154	0.0000	0.3842	0.0818
<b>10-year bond yields</b>	2.1260	0.0654												
<b>10-year bond yields<sub>.1</sub></b>					-1.1880	0.1373					-3.0884	0.1109	-2.1495	0.3197
<b>MOEX<sub>.1</sub></b>	-0.0495	0.5753	0.4040	0.0001			0.9018	0.0022					-0.0450	0.8262
<b>Ruble loans</b>			0.5643	0.3074			1.1343	0.3073						
<b>RUB/USD<sub>.1</sub></b>											-0.3217	0.4745		
<b>Sanctions dummy</b>	0.0022	0.8726	0.0322	0.5184	0.0137	0.0357	-0.0206	0.7809	-0.5505	0.8342	0.0093	0.5564	-1.9757	0.4962
<b>Brent * sanctions</b>	-0.0691	0.6260	0.0543	0.6548	0.0509	0.6308	0.5745	0.1002	-0.1821	0.6512	-0.1930	0.0470	-0.0554	0.8103
<b>10-year bond yields * sanctions</b>	3.9551	0.0147												
<b>10-year bond yields<sub>.1</sub> * sanctions</b>					2.8600	0.0316					6.9652	0.0024	-1.2585	0.6136
<b>MOEX<sub>.1</sub> * sanctions</b>	0.0705	0.7508	-0.2878	0.3272			-0.4851	0.4154					-0.1694	0.6459
<b>Ruble loans * sanctions</b>			-0.3025	0.7442			0.7180	0.6676						
<b>RUB/USD<sub>.1</sub> * sanctions</b>											-0.1445	0.7520		
<b>No. Observations</b>	43		43		43		43		43		43		43	
<b>R<sup>2</sup></b>	0.8295		0.8004		0.8608		0.6313		0.5916		0.8477		0.8870	

Notes: the table contains the estimation results of linear regressions for the dependent variables given in the columns. The sample period is **2009 Q3 - 2020 Q1**. The p-values are calculated by taking into account the results of residual tests. In case the residuals show heteroscedasticity, White standard errors are calculated, while in case of serial correlation, Newey-West standard errors are used.

The RUB/USD exchange rate happened to be a very important explanatory variable in the model of other exports. However, in the shorter sample its significance disappears, providing an evidence that exchange rate must have been relevant only in the crisis period. Regarding the other variables no qualitative changes can be found.

Finally, in the model of total imports, the shorter sample estimation results show that the highly significant positive impact of changes in the Russian stock index can be entirely attributed to the crisis period because now it becomes insignificant before and after the sanctions. Furthermore, bond yields, which were significant in the post sanctions period in the full model, lose their significance. Looking at the estimation results, the most plausible explanation seems to be that this variable does not really affect imports so the model estimates its coefficient imprecisely, leading to confusing results.

Overall, the most models seem to be robust, although some relationships between variables are strongly determined by the financial crisis, in particular MOEX.



## 9. Conclusion

This thesis addressed the question of how the sanctions against Russia affected its economy, in particular its external trade. I studied this issue by focusing on several variables of trade and I considered a relatively broad set of variables to explain those impacts.

I started with a preliminary statistical analysis where I examined the correlation structure of the variables. Then I used a linear regression model with dummy variables and interaction terms to best capture the relationships between them.

My overall finding is that, although the Russian economy obviously suffered from the sanctions, the impact of variables explaining the different dimensions of external trade did not significantly change because of the sanctions. A challenge to this analysis is that the Brent oil price fell heavily in exactly the same period when the first sanctions were imposed and Russia is well-known to be strongly dependent on the oil price. Hence, it is not easy to disentangle the effects of the sanctions and the oil price change, because both are likely to have similar effects on the Russian economy. This is why one of the key explanatory variables was Brent. The fact that other variables also exerted significant influence on the measures of external trade provide some evidence that it is not only Brent that matters. In addition, the regression results clearly show that the explanatory variables do not have a different effect before and after the sanctions.

An additional challenge was the 2008-2009 financial crisis because it caused such a big disruption that can blur the relationships between variables. Thus, as a robustness test, I re-estimated the models in the post-crisis period. The results demonstrate that, although the impacts of some variables (specially MOEX) can be attributed to the crisis period, the overall qualitative results remain unchanged. This and the generally good model fits give confidence that the models are quite well specified.

Despite of the satisfying fit, the thesis suffers from the following shortcomings. First and foremost, provided that some regressors are strongly correlated, the problem of multicollinearity easily arises. Having this in mind, I always carried out statistical tests to measure the extent to which the model suffers from this problem. Second, most of the available trade data is not seasonally adjusted and this seasonality may substantially affect the estimation results and, perhaps, even impair them. Third, the sample period is relatively short, especially the post-sanctions period, which probably impacts the statistical inference on the model parameters. This means that some significant results may not be entirely trustable because standard error calculations rely on asymptotic theory and on small samples.





## References

- Bali, M. 2018. *The Impact of Economic Sanctions on Russia and its Six Greatest European Trade Partners: a Country SVAR Analysis*. ФИНАНСЫ И БИЗНЕС, Издательство Проспект (Москва), Finance & Business, 14 (2), pp.45-67
- Bulatova, A., Abelguzin, N. 2015. *Influence of sanctions on Russia economy*. Actual'niye problemy ekonomiki i prava, 3: 23-34
- Caruso, R. 2003. *The impact of international economic sanctions on trade: An empirical analysis*. Peace Economics, Peace Science, and Public Policy, 9(2), 1-36
- Central Bank of Russia. Annual report of the Bank of Russia for 2019. [http://www.cbr.ru/collection/collection/file/27873/ar\\_2019.pdf](http://www.cbr.ru/collection/collection/file/27873/ar_2019.pdf)
- Gros, D., Mustilli, F. 2015. *The Economic Impact of Sanctions against Russia: Much ado about very little*
- Crozet, M., Hinz, J. 2016. *Collateral Damage: The Impact of the Russia Sanctions on Sanctioning Countries' Exports*. CEPII Working Paper, No 2016-16 – June
- Dreger, C., Fidrmuc, J., Kholodilin, K., & Ulbricht, D. 2016. *Between the hammer and the anvil: The impact of economic sanctions and oil prices on Russia's ruble*. Journal of Comparative Economics, 44(2), 295-308
- Dong, Y., & Li, C. 2018. *Economic sanction games among the US, the EU and Russia: Payoffs and potential effects*. Economic Modelling, 73, 117–128.
- EU restrictive measures in response to the crisis in Ukraine*. Last updated on 25 February 2020. Council of the European Union. [https://eeas.europa.eu/sites/eeas/files/eu\\_restrictive\\_measures\\_in\\_response\\_to\\_crisis\\_in\\_ukraine\\_eng\\_web.doc.pdf](https://eeas.europa.eu/sites/eeas/files/eu_restrictive_measures_in_response_to_crisis_in_ukraine_eng_web.doc.pdf)
- External trade of Russia in 2017-2019 (as of Federal Customs Service of Russia)*. Integrated Foreign Economic Information Portal. [http://www.ved.gov.ru/monitoring/foreign\\_trade\\_statistics/basic\\_goods\\_export/](http://www.ved.gov.ru/monitoring/foreign_trade_statistics/basic_goods_export/)
- Financial Times. 2018. **Can Russia stop using the US dollar?** <https://www.ft.com/content/a5187880-c553-11e8-8670-c5353379f7c2>
- Gurvich, E., & Prilepskiy, I. 2015. *The impact of financial sanctions on the Russian economy*. Russian Journal of Economics, 1(4), 359–385.
- Infographic, 2020. *EU sanctions against Russia over Ukraine*. <https://www.consilium.europa.eu/en/infographics/eu-sanctions-against-russia-over-ukraine/>
- Kholodilin, K. A., & Netšunajev, A. 2018. *Crimea and punishment: the impact of sanctions on Russian economy and economies of the euro area*. Baltic Journal of Economics, 19(1), 39–51.
- Malkov, P. V., Baranov, E. F., et al.. 2019. *Russia in numbers 2019. Official Edition*. Brief statistical booklet. Federal State Statistics Service. [https://rosstat.gov.ru/free\\_doc/doc\\_2019/rusfig/rus19.pdf](https://rosstat.gov.ru/free_doc/doc_2019/rusfig/rus19.pdf)
- Malkov, P. V., Baranov, E. F., et al.. 2019. *Russian Statistical Yearbook*. Federal State Statistics Service. [https://rosstat.gov.ru/storage/mediabank/Ejegodnik\\_2019.pdf](https://rosstat.gov.ru/storage/mediabank/Ejegodnik_2019.pdf)
- Meshkova, A., Vostrikova, E., & Milyushenko, O. 2018. *Trade embargo and opportunities for import substitution*. Vestnik of Omsk University, 1(61): 35-44
- Observatory of Economic Complexity (OEC)*. Accessed on October 20, 2020. <https://oec.world/en/profile/country/rus>
- Pestova, A., & Mamonov, M. 2019. *Should we care? The economic effects of financial sanctions on the Russian economy*. BOFIT Discussion Papers 13/2019

- Siluanov, A. G. 2015. *The Ministry of Finance calculated the losses of Russia from the sanctions and oil prices fall*. <https://www.km.ru/economics/2015/01/29/ministerstvo-finansov-rf/754166-minfin-podschital-poteri-rossii-ot-sanktsii-i-p>
- Tyll, L., Pernica, K., & Arltová, M. 2018. *The impact of economic sanctions on Russian economy and the RUB/USD exchange rate*. *Journal of International Studies*, 11(1), 21-33.
- Vilkas, G. 2019. *IMF Staff Concludes Visit to Russia*. Press release no. 19/425. <https://www.imf.org/en/News/Articles/2019/11/20/pr19425-russia-imf-staff-concludes-visit-to-russia>

## Appendix A. The resume of EU and USA sanctions.

Date	Sanctions' resume	Country
20/03/2014	Ban on property and suspension of entry of Rossija Bank	USA
27/03/2014	Ban on the issuance of export licenses for defense products or services	USA
11/04/2014	Ban on property and suspension of specific entities	USA
28/04/2014	Restrictions on defense imports and exports from/to Russia	USA
29/04/2014	Ban on property and suspension of specific entities	EU
12/05/2014	Ban on property and suspension of specific entities	EU
16/07/2014	Sanctions on two major banks (Gazprombank and VEB) and energy companies (Novatek and Rosneft) and eight arms companies	USA
18/07/2014	European Investment Bank suspends funding for projects in Russia	EU
25/07/2014	Blocking property and suspension of the total of 20 organizations	EU
29/07/2014	Treasury sanctions on financial, energy and defense technology institutions	USA
31/07/2014	1) Exports of dual-use goods and technology restrictions; 2) Sale, supply, transfer or export of certain technologies for the oil industry restrictions; 3) Access to the capital market for certain financial institutions restrictions. Partial ban on investments in Crimea.	EU
06/08/2014	Restrictions on the export of various oil and gas technologies to Russia	USA
12/09/2014	Financing of Rosneft, Transneft, and Gazpromneft banned. Loans to five Russian state banks restricted. Financing of 3 defense manufacturers banned, nine Russian defense concerns were added to sanctions list.	EU
12/09/2014	US Treasury bans U.S. companies from supplying goods and technologies to Gazprom, Lukoil, Transneft, Gazprom Neft, Surgutneftegaz, Novatek, and Rosneft. Assets of five Russian defense companies frozen. Capital market restrictions imposed on six Russian banks.	USA
19/12/2014	Export and import of goods and services to/from Crimea banned	EU and USA
16/02/2015	Nine defense entities were added to sanctions list	EU
04/03/2015	All U.S. sanctions imposed on Russia in 2014 <b>extended by one year.</b>	USA
22/06/2015	The Council extended EU economic sanctions* until <b>31 January 2016.</b>	EU
24/06/2015	Punishments for foreign banks collaborating with sanctioned Russian entities come into force.	USA
30/07/2015	US Treasury includes 15 entities into sanctions list.	USA
21/12/2015	The Council prolonged EU economic sanctions* against Russia until <b>31 July 2016.</b>	EU
22/12/2015	US Treasury includes 34 individuals and entities into sanctions list.	USA
02/03/2016	Extention of economic sanctions <b>by one year.</b>	USA

10/03/2016	The Council prolonged sanctions against 37 entities extended to <b>September 15, 2016</b> .	EU
17/06/2016	Sanctions on Crimea extended to <b>June 23, 2017</b> .	EU
01/07/2016	The Council prolonged the economic sanctions targeting specific sectors* of the Russian economy until <b>31 January 2017</b> . They apply to 146 persons and 37 entities.	EU
01/09/2016	Sanctions for a number of entities, mostly local subsidiaries of Gazprom.	USA
06/09/2019	Addition of 11 entities to its sanctions list. The list now includes 81 entities in total.	USA
15/09/2016	The Council extended the application of sanctions on specific entities of the Russian economy, <b>until 31 March 2017</b> . They apply to 146 persons and 37 entities.	EU
19/12/2016	The Council extended the application of economic sanctions targeting specific sectors* of the Russian economy, <b>until 31 July 2017</b> . They apply to 152 persons and 37 entities.	EU
13/01/2017	Economic sanctions extended <b>by one year</b> .	USA
15/03/2017	The Council extended the application of sanctions on specific entities of the Russian economy, until <b>15 September 2017</b> . They apply to 150 persons and 37 entities.	EU
19/06/2017	Sanctions on Crimea extended to <b>June 23, 2018</b> .	EU
28/06/2017	The Council prolonged economic sanctions targeting specific sectors* of the Russian economy until <b>31 January 2018</b> . They apply to 150 persons and 37 entities.	EU
14/09/2017	The Council extended the application of sanctions on specific entities of the Russian economy, <b>until 15 March 2018</b> . They apply to 150 persons and 37 entities.	EU
21/12/2017	The Council prolonged economic sanctions targeting specific sectors* of the Russian economy until <b>31 July 2018</b> . They apply to 150 persons and 38 entities.	EU
26/01/2018	Sanctions on 9 companies.	USA
02/03/2018	Economic sanctions extended <b>by one year</b> .	USA
12/03/2018	The Council prolonged for a further six months, until 15 September 2018, the application of sanctions. They apply to 150 persons and 38 entities.	EU
18/06/2018	EU sanctions on Crimea extended to <b>June 23, 2019</b> . **	EU
05/07/2018	The Council prolonged economic sanctions targeting specific sectors* of the Russian economy by six months until <b>31 January 2019</b> . They apply to 155 persons and 38 entities.	EU
31/07/2018	The EU added six entities to the sanctions list because of their involvement in the construction of the Kerch Bridge, connecting Russia to Crimean peninsula.	EU
27/08/2018	Ban on arms sales, arms-sales financing, U.S. government credit or other financial assistance, exports of national-security-sensitive goods, and most foreign assistance to Russia under the terms of the Chemical and Biological Weapons Control and Elimination Act.	USA
13/09/2018	The Council prolonged corporate sanctions targeting specific sectors of the Russian economy until <b>15 March 2019</b> .	EU

21/12/2018	The Council prolonged economic sanctions targeting specific sectors* of the Russian economy until <b>31 July 2019</b> . They apply to 164 persons and 44 entities.	EU
03/2019	Sanctions on companies involved in the Russian shipbuilding industry in response to the Kerch Strait incident.	USA
20/06/2019	The Council extended the restrictive measures in response to the illegal annexation of Crimea and Sevastopol by Russia until <b>23 June 2020**</b> .	EU
27/06/2019	The Council prolonged economic sanctions targeting specific sectors* of the Russian economy until <b>31 January 2020</b> .	EU
02/08/2019	1. US opposition to any loan or financial assistance to Russia by int'l financial institutions (IFIs) such as World Bank or IMF, 2. prohibition on US banks' (i) participating in the primary market for non-ruble denominated Russian sovereign debt, and (ii) lending non-ruble denominated funds to the Russian government, 3. additional export licensing restrictions on Dep't of Commerce controlled goods / technology (items controlled for chemical and biological weapons proliferation reasons).	USA
12/09/2019	The Council has extended the EU restrictive measures for a further six months, until 15 March 2020. The measures consist of asset freezes and travel restrictions. They apply to 170 persons and 44 entities.	EU
19/12/2019	The Council prolonged the economic sanctions* targeting specific sectors of the Russian economy until <b>31 July 2020</b> .	EU
13/03/2020	Asset freeze of entities.	EU
10/09/2020	Asset freeze of entities.	EU
01/10/2020	Asset freeze of four entities.	EU

Sources: Elaborated by the author based on:

Official Journal of the European Union, <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1602323541502&uri=CELEX:02014D0145-20200912> ;

US Department of the Treasury, Ukraine-/Russia-related Sanctions

<https://home.treasury.gov/policy-issues/financial-sanctions/sanctions-programs-and-country-information/ukraine-russia-related-sanctions>

\* The measures target the **financial, energy and defence sectors, and the area of dual-use goods**. They were originally introduced on 31 July 2014 for one year in response to Russia's actions destabilising the situation in Ukraine and strengthened in September 2014.

The economic sanctions prolonged by this decision include:

- limiting access to EU primary and secondary capital markets for 5 major Russian majority state-owned financial institutions and their majority-owned subsidiaries established outside of the EU, as well as three major Russian energy and three defence companies
- imposing an export and import ban on trade in arms
- establishing an export ban for dual-use goods for military use or military end users in Russia
- curtailing Russian access to certain sensitive technologies and services that can be used for oil production and exploration.

In addition to these economic sanctions, several EU measures are also in place in response to the crisis in Ukraine including:

- targeted individual restrictive measures, namely a visa ban and an asset freeze currently against 170 individuals and 44 entities, in force until 15 September 2019;
- restrictive measures in response to the illegal annexation of Crimea and Sevastopol, limited to the territory of Crimea and Sevastopol, in force until 23 June 2020.

The duration of the economic sanctions was linked by the European Council on 19 March 2015 to the complete implementation of the Minsk Agreements, which was foreseen to take place by 31 December 2015. Since this did not happen, the sanctions have remained in place.

\*\* The sanctions include prohibitions on: imports of products to Crimea, investments in Crimea, tourism services, exports of certain goods and technologies to Crimean companies, related to oil, gas and mineral resources.

## Appendix B. Russian counter-sanctions.

Date	Sanctions' resume
06/08/2014	Russia bans the import of most foodstuffs from the countries that imposed sanctions on it: United States, the EU, Norway, Canada and Australia, including a ban on fruit, vegetables, meat, fish, milk and dairy imports.
24/06/2015	Russia extends food import ban to August 6, 2016 in response to EU extension
06/08/2016	Russia extends food import ban to December 31, 2017
05/07/2017	Russia extends food import ban to end of 2018.
05/07/2018	Russia extends food import ban to end of 2019.
24/06/2019	Russia extends food import ban to end of 2020.

Sources: Elaborated by the author based on:

1. European Commission, Russian import ban on EU products

[https://ec.europa.eu/food/safety/international\\_affairs/eu\\_russia/russian\\_import\\_ban\\_eu\\_products\\_en](https://ec.europa.eu/food/safety/international_affairs/eu_russia/russian_import_ban_eu_products_en)

2. Ministry of Foreign Affairs of the Russian Federation, Россия-ЕС. Санкции и контр санкции. (Russia-EU. Sanctions and counter-sanctions). <https://www.mid.ru/rossia-es.-sankcii-i-kontr-sankcii>

3. United States Department of Agriculture, Foreign Agricultural Service.

<https://www.fas.usda.gov/>





## Appendix C. Unit root test results

	Level		Log difference*	
	t-statistic	p-value	t-statistic	p-value
<b>Total exports</b>	-2.2732	0.1837	-4.1180	<b>0.0018</b>
<b>Total imports</b>	-2.2205	0.2012	-4.0457	<b>0.0023</b>
<b>Oil exports</b>	-2.2504	0.1910	-7.0239	<b>0.0000</b>
<b>Oil product exports</b>	-1.9792	0.2952	-6.1407	<b>0.0000</b>
<b>Gas exports</b>	-3.0655	<b>0.0340</b>	-8.6168	<b>0.0000</b>
<b>Other exports</b>	-2.1725	0.2182	-4.1043	<b>0.0019</b>
<b>GDP</b>	-2.5494	0.1090	-1.9735	0.2976
<b>REER</b>	-2.4181	0.1406	-9.4977	<b>0.0000</b>
<b>Brent</b>	-2.6324	<b>0.0916</b>	-6.4825	<b>0.0000</b>
<b>Bank loans in rubles</b>	0.8515	0.9940	-2.5040	0.1204
<b>Bank loans in foreign currencies</b>	-1.1311	0.6964	-2.6734	<b>0.0858</b>
<b>10-year bond yields</b>	-3.5850	<b>0.0086</b>	-7.1343	<b>0.0000</b>
<b>MOEX</b>	-1.2133	0.6641	-6.1735	<b>0.0000</b>

Notes: The table contains the results of Augmented Dickey-Fuller test for the presence of a unit root both in levels and in log differences. For bond yields, I take simple difference.