

Analysis of the impact of economic and institutional factors on Russian exports of oil products

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Abstract:

For a long time and worldwide, oil products have been amid the most traded commodities. All the countries of the world participate in oil products trade, with Russia being one of the major influencers in the field. Russia's export relations are influenced by a number of factors, political, economical, social and natural ones. The study outlines the influence of some of these factors on the Russian export of oil products, through the application of gravity equation methodology. Along with the classical variables of the gravity equation, the study analyzes the influence of sanctions introduced by certain countries against Russia, as well as the influence of some of Russia's trade partners from the former Soviet Bloc on export relations. Russia's export relations in oil products with 24 countries for the period of 2000-2018 are considered for the purpose. The results of the study showed the negative impact of sanctions and the participation of the importing country in the Soviet bloc on Russian exports of oil products.

Key Word: oil products, Russia, export, gravity equation, sanctions, Soviet bloc.

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I. Introduction

Oil products are significant export/import commodities in the trade balance of all countries. According to the trade statistics provided by COMTRADE, the aggregate export volume of products with HS codes 2710, 2712, 2713, 2714, 2715 in the overall world export over the last 20 years has an average share of ca. 4%. In comparison to crude oil, oil products are more complex due to the wide nomenclature, transportation requirements and application of more advanced technologies for their production. As far as the production goes, the world export of oil products is concentrated around such countries as USA, China, Belgium, the Netherlands, India, Republic of Korea and Russia, with these countries accounting for more than 50% of the world export flow of oil products in recent years.

The position of Russia within this set of countries is unique, since even though all these countries export of oil products, they are pure importers of crude oil; it is also important to underscore that Russia has accounted for ca. 9-10% in the world oil products trade in last 10 years. Export of oil products lets Russia to diversify and improve its export position in the context of oil trade that includes crude oil and oil products; besides, export of oil products helped to improve the technological situation in Russia due to the production of more advanced products. In a series of studies of the Russian energy strategies it is emphasized that this strategy is focused on the increase of oil products production and on diversification of Russian oil export trade (Mastepanov (2014), Kapustin and Grushevenko (2018), Demakova and Godzimirski (2012)).

Russia has a long-standing history of relations with most of its trading partners in area of oil trade. Meanwhile, these export trade relations, especially in the last 10-20 years, have to face the challenges created by the emergence of the new sellers, as well as by the collapse of the USSR and the membership of the former members of the Soviet Bloc to the EU, ongoing political tensions and tensions with some of the old partners. Most of the studies of Russian oil export are primarily concentrated on crude oil export, and analyze export relations within the framework of the analysis of strategies and strategic interactions (Henderson (2011), Henderson (2013), Henderson (2015), Skalamera (2016), Locatelli (2006)). It is very important, however, to offer quantitative analysis of the influence of various factors related to the export markets in the context of their impact on the Russian oil products export. One of the universally accepted methodologies applied for the analysis of influence of market parameters on export flows is the gravity equation of export flow Yotov et al. (2016).

As far as we know, there haven't been any studies that would analyze Russian oil products export from the perspective of gravity equation of export flow. Here we offer the gravity-based analysis of export flow of Russian oil products to the 24 main export markets over the period of 2000-2018, for the case of export flow

that includes the oil products with the following HS codes: 2710, 2712, 2713, 2714, 2715. The goal is to describe the influence of the main parameters on Russian export in case of oil products on the quantitative level.

This study is organized in the following way: after this introduction, we offer the literature review of export flow analysis that is based on gravity equation methodology, then the description of the model for the analysis of export flow and estimation issues, after that we offer the description of variables applied in the model and the theoretical data sources, in the following part the results of estimation and their discussion are presented; after that comes the conclusion that outlines our main findings.

II. Literature Review

Postulates of gravity equation of international trade are applied for our analysis. The first application of a gravity-type model for international trade was proposed and developed Tinbergen (1962), initially as an empirical model. After that, the gravity model of trade was connected with the main theories of international trade (Anderson (1979), Bergstrand (1985), Deardorff (1998), Evenett and Keller (2002)). One of the most important works on theoretical gravity model is the Anderson and Van Wincoop (2003), they have developed a method that allows to consistently estimate the theoretical gravity model; besides, their method lets to solve the border puzzle presented in the work McCallum (1995): according to McCallum's modelling results, a common border dramatically reduces bilateral trade between countries, even though the results provided by Anderson and Van Wincoop suggest that a common border does not produce such an extreme effect, their results have been confirmed in many subsequent studies.

Most studies insist on the positive effect of such parameters as the GDP, regional trade agreement, common currency, participation in political and economic unions on export flow; this much has been shown by the meta-analysis of 159 papers made by Head and Mayer (2013), besides, they testify to the negative influence of distance on export flows. Among the other negative influences on export flows are the differences in import tariffs and politico-economic challenges, such as sanctions imposed on countries for a variety of reasons. The study by Baier and Bergstrand (2001) that applies gravity equation methodology to the export flow analysis suggests that tariff reduction accounts for ca. 25% of export growth. A series of studies (Felbermayr et al. (2019), Farzanegan et al. (2016), Rasoulinezhad (2016, 2017) analyze the influence of sanctions on oil exporting countries with Iran taken as a case study, all these studies prove the negative impact of sanctions on the Iranian oil trade and economy. Other studies Dreger et al. (2016) Rasoulinezhad (2019), that analyze the effect of sanctions on the Russian economy, do not provide a clear answer as to the effects of sanctions on the overall Russian economy and its international oil trade.

III. Empirical Model

Our empirical model is based on the assumptions of the theoretical gravity equation of trade. For this particular case, we have created the following model of export flow that describes the Russian oil products export.

Model:

$$Export_{r,i,t} = \exp(\beta_0 + \beta_1 * \ln(GDP_{r,i,t}) + \beta_2 * \ln(Dist_{r,i}) + \beta_3 * Border_{r,i} + \beta_4 * \ln(Tariff_{i,t}) + \beta_5 * \ln(Exch_{i,t}) + \beta_6 * Sanction_{i,t} + \beta_7 * Sovietbloc_i + \varepsilon_{ij})$$

Where the indexes have the next meaning: (r) - presents Russia, (i)- presents importer country and (t) presents moment of time (year).

During the process of estimation, there's always a danger of running into the estimation issues that would render the results inconsistent and biased. One of the possible issues in the estimation of gravity model is heteroscedasticity. According to various sources, heteroscedasticity can occur in the empirical studies with a high level of probability (Shepherd, 2013). The problem can be solved by methodology proposed by (Silva and Tenreyro, 2006). They stated that, in the case of the inclusion of heteroscedasticity, gravity equation should be estimated through PPML or GPML methodology. In our case of products flows, we have cases of zero trade flows, a low level of export that can also be taken for zero. The methodology of estimation applied to heteroscedasticity proposed by (Silva and Tenreyro, 2006) is one of the possible solutions for zero trade flows. So our model is estimated via PPML methodology. The next issue, high probability in our case, is unobserved heterogeneity. In the case of oil trade, due to the complexity of market trade flows, it is under the influence of various factors. Owing to the lack of information and the impossibility to account for all the possible variables' influence on trade flow, the case of unobserved heterogeneity is obvious. It cannot include and identify all possible effects. To solve the problem of unobserved heterogeneity, a number of variables may be applied, we apply the one of the former Soviet Bloc countries to control the unobserved heterogeneity.

IV. Variables and Data

For the correct estimation of our gravity type models that set the goal to obtain sustainable and clear results, data have to be collected from trustworthy sources, appropriate and acceptable. For the case of estimation of trade flows from Russia to the importers of Russian oil products, this study applies the following set of variables.

The dependent variable ($Export_{r,i,t}$) is the export flow from Russia (r) to the importing country (i) (the export volume of Russian oil products (HS2710+HS2712+HS2713+HS2714+HS2715) in nominal USD), (t) - moment of time. The source of data is a COMTRADE database for the period of 2000-2018. For all the variables that are measured in USD in the proposed model, we chose the nominal USD data. This study deals with the Russian oil products export flows to the following countries: Bulgaria, China, Croatia, Czech Republic, Finland, France, Germany, Greece, Hungary, India, Italy, Japan, Republic of Korea, the Netherlands, Lithuania, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Turkey, USA, United Kingdom.

The first explanatory variable ($GDP_{r,i,t}$) is aggregated GDP, presented by the multiplication of GDP of Russia and the importer country. This variable is widely used to represent the economic power of countries. Aggregated GDP symbolizes the size of market. In the proposed model, we have opted for the nominal aggregated GDP in USD. The source of data for this variable is the World Bank database for the period of 2000-2018.

The second explanatory variable ($Dist_{r,i}$) in the proposed model is physical distance between Russia and importer. This variable was used in all the general gravity type equations from the moment of their emergence. Distance accounts for a set of factors that combine in the process of transportation, and determines the cost of transportation. The source of distance data for the proposed model is CEPII 2017 database.

In the analysis of trade flow, variable of common border is widely applied. Because of the specific geographical position of Russia, that has the longest border in the world, we would assume that, for Russia, common border is, in general, an important factor. We offer some examples of the countries that have common borders with Russia, such as China. Russia has common borders with many European countries. We account for the influence of common border by including the dummy variable ($Border_{r,i}$) into the model, that is equal to one for the presence of common border, and to zero otherwise. The data source for this variable is CEPII 2017.

The next variable ($Tariff_{i,t}$) is the average tariff on imported goods in importer country. That variable represents the trade policy of a country. The data on the types of tariffs is available at various data sources. We have opted for World Bank database as the data source.

The next variable ($Exch_{i,t}$) also represents a feature of economic and financial policy of importer country, namely, the exchange rate. USD acts as a currency for numeraire (supplement) for oil trade in general. The role of exchange rate in the proposed model is represented by the variable of the local currency unit, USD. The data was obtained from the World Bank database.

Participation in the Soviet bloc is represented by the dummy variable ($Sovietbloc_i$) that amounts to one, if a country wasn't a member, it is equal to zero. This variable is a combination of historical and institutional impact on the export trade of oil products from Russia. Due to the infrastructure these countries have, they are oriented on refining Soviet/Russian crude oil. We can suppose that such influence is not positive. The data source for this variable is the UN information system.

Another important variable ($Sanction_{i,t}$) is sanctions, that represent the imposition of set of sanctions on Russia by a country (i) in the year (t). It is a dummy variable, that has the value of one if a country imposes sanctions and zero otherwise. Sanctions are a relatively widespread instrument of international policy. Some types of sanctions influence economies of the targeted countries. Main reason of sanctions, implemented towards economic aspects, is to achieve political and economic targets. So, in the case of Russia, when many biggest Russian crude oil and oil products buyers have implemented sanctions, it is important to estimate the role of them in the Russian trade flow. The data sources are the national government websites of the observed countries.

V. Results and Discussion

The results of estimations are displayed in the Table 1 below. The product set indicates the aggregated trade flow of oil products, where HS2710; HS2712; HS2713; HS2714; HS2715 are included. The period of observation here is 2000-2018. The set of 24 countries is applied.

Initially, the results of the effects of the GDP size are observed. The results of estimations are statistically significant and the coefficient of this variable is positive. The coefficient level aligns with most studies. The growth of economic size by 1%, increases the export flow by ca. 0.94%. The results of the estimation imply that Russia, in oil products export, has a growing tendency of exporting its oil products to the countries with relatively high GDP level. Economic size of oil products export produces a stronger influence on trade flow. The higher GDP of importing country entails the higher export flow of Russian oil products.

The distance shows the resistance to trade approximated by geographic distance. The results of estimation are statistically significant and indicate a negative influence on the Russian oil products export flow. Increase in the barrier to trade displayed by distance by 1% decreases the export flow by ca. 1.28%. Therefore, we can assume that, in oil products trade, distant countries seem to present a less attractive market for the Russian oil products export. Oil products need a bigger variety of transportation than crude oil. Consequently, the transportation of oil products to the same destination is usually more expensive than the transportation of crude oil. The coefficient at this variable reflects the real market situation, where transportation of oil products is costlier than that of crude oil.

Table no 1. Results of estimations of Russian oil products export flow, empirical model

Export _{r,i,t}	(1)	(2)	(3)
Ln(GDP _{r,i,t})	0.9244*** (0.0001)	0.9819*** (0.0001)	0.9152*** (0.0001)
Ln(Dist _{r,i})	-1.1148** (0.4881)	-1.7517*** (0.4311)	-1.4699*** (0.4685)
Border _{r,i}		-0.5962 (0.6234)	-0.5050 (0.6060)
Exch _{i,t}			-0.0003*** (0.0000)
Tariff _{i,t}			-0.0339*** (0.0001)
Sanctions _{i,t}			-0.0369 (0.0001)
Sovietbloc _i		-1.4001** (0.5967)	-1.3431** (0.6086)
Cons	-28.2319*** (4.5326)	-23.5057*** (3.4823)	-24.6148 (3.5506)
Number of observations	456	456	456
Prob > chi ²	0.0000	0.0000	0.0000

Note: *, **, ***- level of statistical significance: 10%; 5%; 1%.

The role of common border in trade flow in our estimations is statistically insignificant.

Concerning the influence on the Russian oil products export flow of such variables as the regulation of import by imposing tariffs, and influence on import of monetary policy as reflected in the exchange rate of domestic currency to USD, the following can be stated: in tariff, results of estimation account for statistically significant and negative influence on export flow of oil products. The influence of tariff on export flow in Russian oil products is not high: changes of tariffs by 1% change the trade flow by ca. -0.033%. The tariff plays a negative and significant role, but the influence of tariff on export flow is small. It is important to note that low influence of tariff on oil products indicates the real situation on market where, in most cases, countries in the observed set are the pure importers of these products and have a great need for them. The monetary policy reflected through exchange rate in the estimation of this product set informs about the coefficient at variable that has a high statistical significance and exerts a negative influence on export flow. The change of 1 unit of exchange rate only influences the trade flow by -0.0003%. The most of observed countries have a strong currency. The currency exchange fluctuation in these countries does not strongly influence the Russian oil export flow. In oil products trade, where contracts are signed in national currencies, the influence of exchange rate on oil trade is visibly small due to the strong national currencies in most of the countries within the set.

The next set of variables represents a host of institutional influences on export flow. The first observed variable is Sanctions, since sanctions are applied by some countries of the analyzed set. The result of estimation features a statistically significant influence, that has a negative outcome in the case when a country has imposed sanctions against Russia. The results of the current estimation are in accordance with the predictions of previous studies, conducted for other countries. If a country imposes sanctions, the export flow of Russian oil products decreases by ca. 0.04%. The influence is relatively small, less than 1%, and most countries that have imposed the sanctions are Russia's old trade partners. So, it seems that long-standing trade relations in oil products tend to decrease the negative outcomes of sanctions. The role of factor Soviet accounts for the participation of some countries in the Soviet Bloc, which is a statistically significant result of estimation. For our product set, participation in Soviet Bloc seems to account for the negative outcome for the Russian oil products export. For the countries that have been members of the Soviet Bloc, the decrease of Russian oil products export is ca. 1.3%. Arguably, this is the outcome of the former relations, when the Soviet Union exported crude oil to the Soviet Bloc countries. Based on this supposition, we would suggest that these countries have a relatively strong

refinery industry, that competes with the Russian oil products and their infrastructure needs in crude oil. Participation in the Soviet Bloc is a negative outcome for the Russian oil products export.

VI. Conclusion

We have analyzed the Russian oil products export flows to 24 countries for the period of 2000-2018, and the results of the analysis testify to the applicability of gravity equation methodology for the case of oil products trade. The results of estimation prove the positive influence of GDP size on export flow; in case of oil products export, results are close to most of the studies, another variable that is used in all gravity equations, distance, exerts a significant negative influence on export flows. All other variables, with the exception of the common border one, exert a statistically significant influence on export flow.

The influences of monetary and trade policy on export flow seem to be minor, and we would explain the fact of the small influence of exchange rate on export flow by the fact that most of the countries we've analyzed have the national currency that is one of the world reserve currencies; the influence of import tariffs on export flow is low due to many factors, e. g. all the analyzed countries are members of WTO that stimulates trade liberalization; it can also be due the fact that all the countries in question are the biggest importers of oil products in the world market. Of special interest are the results of estimations of influence of such factors as sanctions and participation in the Soviet Bloc.

Sanctions exert a statistically significant, but very small (less than 0.05%) negative influence on the export of oil products. This can be explained by the specifics of the Russian oil products trade, that has a long history and strong partnership with most of the current trading partners, and this fact might cancel the negative influence of sanctions. According to the results of our estimations, countries of the former Soviet Bloc are not a major prospective market for the Russian oil products; participation of a country in the Soviet Bloc accounts for a strong negative influence on the Russian oil products export, and this can be explained by the fact that these countries (Soviet Bloc) are mainly oriented on Russian crude oil export, due to the historical relations. We have shown that it is possible to analyze and identify the level of influence of various factors on export flow in the case of such a complex export trade as oil products trade.

The results show that Russian oil products trade is under the influence of various factors, with institutional, political, sanction-related and Soviet Bloc participation-related ones showing a statistically significant negative influence. This fact merits further investigation and analysis, with the application of additional estimation techniques and additional concepts.

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