

The effect of Russian unfriendly-country list and import ban: Gravity framework test

Mikhail Krivko

Department of Trade and Finance, Faculty of Economics and Management, Czech University of Life Sciences in Prague, Czechia
krivko@pef.czu.cz
ORCID 0000-0003-2261-8154

Stanislava Kontsevaya

Department of Trade and Finance, Faculty of Economics and Management, Czech University of Life Sciences in Prague, Czechia
kontsevaya@pef.czu.cz
ORCID 0000-0002-1222-1682

Luboš Smutka

Department of Trade and Finance, Faculty of Economics and Management, Czech University of Life Sciences in Prague, Czechia
smutka@pef.czu.cz
ORCID 0000-0001-5385-1333

Abstract. Since 2021, Russia has maintained a list of unfriendly countries. This list and the import ban list introduced in 2014 are some of the main economic sanctions Russia uses to influence trading partners. This paper attempts to quantify the effect of putting a trading partner on the list of unfriendly countries compared to the Russian import ban. The study uses the data on trade flows between Russia and its trading partners from the UN COMTRADE database for select agri-food products. Employing a gravity framework, we argue that countries added to the unfriendly list in 2022 often had already lost a significant part of exports due to the 2014 Russian import ban introduction. Thus, such countries did not experience significant change compared to the effects of the Russian import ban. Based on this conclusion, Russia has a limited capacity to apply such retaliatory measures to Western countries regarding agri-food trade. Our results also demonstrate that the presence of the import ban drives export flows of the studied products, while the GDP of the trading partner also plays an important role, albeit with a lower magnitude.

Received:
September, 2022
1st Revision:
April, 2023
Accepted:
May, 2023

DOI:
10.14254/2071-
8330.2023/16-2/4

Keywords: international trade, Russian import ban, unfriendliness, gravity model.

JEL Classification: C01, C23, F14, Q1, J10, J11

1. INTRODUCTION

Countries participating in international trade face risks and benefits (Gervais, 2018; Niepmann & Schmidt-Eisenlohr, 2017; Horská et al., 2023). International trade has significantly changed over the past 30 years (Cepeda-López et al., 2019; Fagiolo, 2010). The leading players have changed, traders have clustered, volumes of exported and imported goods have significantly increased, and trade specialization of the countries has deepened. International trade undergoes also the challenges of the industrial revolution and digital transition (Rymarczyk, 2021).

Over the recent decades, the development of international trade has been closely connected with trade liberalization and protectionism. On the one hand, many regional and global trade liberalization initiatives have emerged, such as the World Trade Organization (WTO) enlargement or the conclusion of regional trade agreements (RTAs). On the other hand, some of the significant players have attempted to implement protectionist policies against their trade partners. Some of these policies include economic sanctions in the form of export and import restrictions aimed at specific trading partners. One of the recent examples of such a policy is the introduction of the Russian import ban. The Russian import ban was introduced in August 2014 as a countermeasure to individual and sectoral economic sanctions imposed by the European Union (EU) and the United States of America (USA) on Russia earlier in the same year (European Commission, 2019; Boulanger et al., 2016). Initially, the ban was introduced for one year; however, it has been prolonged yearly since then. Researchers have noted several effects of the Russian import ban. The oil price shock of 2014 had a more significant impact on the Russian economy than the European sanctions and the Russian import ban (Dreger et al., 2016; Kholodilin & Netsunajev, 2019). Western sanctions against specific technology transfers to Russia did not affect imports to Russia, while the import ban resulted in about eight times greater loss of trade (Bělin & Hanousek, 2021). Several studies consider rebalancing of the trade flows between EU and EAEU countries due to the import ban; however, the reported trade effects are multidirectional. The EU countries have managed to re-route their agricultural exports to other destinations (Uzun & Loginova, 2016; Yuri et al., 2020) while neighboring countries showed signs of re-exporting the banned products (Liefert & Liefert, 2015; Romashkin et al., 2020).

In 2021, Russia introduced a list of unfriendly countries, which initially included the USA and Czechia. In 2022, this list was significantly enlarged by including all countries that introduced economic sanctions against Russia. The list has emerged as a retaliatory measure from the side of Russia and therefore represents an example of economic sanctions. Keeping in mind the fact that up to 70% of economic sanctions cases do not achieve their declared goals (see discussion of economic sanctions in Hufbauer et al., 1990; Early, 2015; Felbermayr et al., 2020), there are still some unanswered questions related to the effectiveness of unfriendly list. One of these questions is the level of magnitude of the trade effect for the countries included in the list. To the best of our knowledge, there is a gap in the research, which we attempt to fulfill by applying the gravity framework to quantify the effect of unfriendliness and compare it to the effect of the Russian import ban. The current study attempts to answer the following research questions:

1. What is the trade effect for a country included in the unfriendly list?
2. Does the effect of inclusion in an unfriendly list have a higher magnitude than the import ban?

The study aims to answer the research questions by estimating a set of gravity models to find the most appropriate model for subsets of data, as well as defining variables that are significant in the context of the Russian import ban and the presence of the unfriendliness effect.

2. LITERATURE REVIEW

The list of unfriendly countries was first introduced in 2018. Initially, only the United States of America was in the scope of this list, with the option to include additional countries in the future (President of the Russian Federation,

2018). In 2021, the Czech Republic was added to the list (Government of the Russian Federation, 2021). Later, this list was enlarged to include countries that introduced economic sanctions or any other restrictive measures against Russian officials, organizations, and individuals affiliated with the state (Government of the Russian Federation, 2022). The main additions to this list were made after a group of Western countries imposed several sanction packages. These additions included countries of the European Union, the United States of America, the United Kingdom, Australia, New Zealand, South Korea, and some others (see Appendix 1 for the list of countries in the unfriendly list used in current research). Inclusion into the list entails the possibility for the Russian Government to impose restrictions on trade in goods and services, investments, international cooperation, and other measures which might be deemed needed by the government. It is still to be confirmed, whether the list of unfriendly countries can be considered an imposition of economic sanctions or a threat to impose economic sanctions. As was previously shown by Afesorgbor (2019), this might imply opposite dynamics in the development of trade flows.

The introduction (and later enlargement) of the unfriendly countries list represents a countermeasure which Russian officials used to react to the increasing economic sanctions pressure from various other countries. This reaction was not the first attempt to impose countersanctions. In August 2014, introducing the first package of Western economic sanctions on Russia, the country responded by banning specific agri-food products (originating from countries that joined the sanctions package) from entering the Russian market. This reaction was not entirely unexpected as it stems from the 2010 Doctrine on Food Security, which covered all products in the scope of the ban. Several studies have been done to determine the effects of the Russian import ban on both sending (Russia) and target (Western countries that joined economic sanctions imposed on Russia) and the effects of the ban have been proven to be unevenly distributed across product groups and trading partners (Wengle, 2016; Liefert et al., 2019; Boulanger et al., 2016; Fedoseeva & Herrmann, 2019; Kholodilin and Netsunajev, 2019; Chepeta & Gaigne, 2020; Bělin & Hanousek, 2021).

Russian import ban can be considered one of the most recent examples of protectionist policy. At the same time, it is an example of countersanctions, a retaliatory action against externally imposed economic sanctions. This feature makes the Russian import ban very similar to the introduction of the unfriendly countries list. One can even argue that the list of unfriendly countries is the extension (or continuation) of the same ban. One can also question whether these two episodes of retaliatory measures are comparable in the effect's direction, distribution, magnitude, and longevity. This article attempts to compare the magnitude of these two episodes' effects by applying the gravity framework.

Data is one of the significant limitations in the studies of international trade, which is primarily presented in monetary units, not in physical terms. It makes the calculations subject to bias (Ferguson & Gars, 2020). Several methods for evaluating the events in international trade exist. The RAS approach (Boero et al., 2018) is used for international trade models with limited number of variables. Babula et al. (2005) suggest using VAR (vector autoregression model) to estimate the non-tariff impact on international trade.

The gravity model of international trade remains one of the widely used methods. The gravity model is usually used to estimate the monetary bilateral exchange. Therefore, the gravity model was chosen in this paper to study the trade effects of unfriendliness and the Russian import ban for the selected product groups. Many scientists investigated gravity models dedicated to the whole country (Ravishankar & Stack, 2014; Narayan & Nguyen, 2016; Oguledo & MacPhee, 1994) and individual products and types of agricultural products such as meat, wine, fruit, and seafood (Koo et al., 1994; Melo et al., 2014; Natale et al., 2015). Many pieces of research were focused on the implementation of gravity models in assessing various trade unions such as OECD, RTA, and ASEAN or EU (Maciejewski & Wach, 2019; Wach & Wojciechowski, 2014). One of the findings is that changes in trade flows are often associated with the creation of trade unions (Grant & Lambert, 2008; Olper & Raimondi, 2008; Brun et al., 2005; Yang & Martinez-Zarzoso, 2014).

It is very important to assess regulation methods for tariff and non-tariff measures to understand the mechanisms of international trade (Hajdukeiwicz & Pera, 2021; Czermińska, 2022). Gravity models are traditionally used to assess the impact of product standards and food safety standards on trade flows (Ferro et al., 2015; Shepherd & Wilson, 2013; Ehrlich & Mangelsdorf, 2018). The embargo (or ban, in other words) has a similar effect on trade flows as product standards. Afesorgbor (2019) studied the impact of the embargo by using a gravity model based on data for 60 years. The author has found that the embargo reduces trade flows; however, the threat of the embargo, on the contrary, stimulates trade. Esfahani & Rasoulinezhad (2017) on the example of Iran and the European Union confirms the

negative impact of the embargo on trade flow. A numerical general equilibrium model with trade cost and exogenous trade imbalance (Dong & Li, 2018) and a triple-difference estimation strategy (Cheptea & Gaigné, 2020) were used to study the impact of the embargo between Russia, the European Union and the United States.

Jan Tinbergen (1962) first came up with the use of Newton's law of gravity when analyzing trade flows between countries. He used the relationship between the GDP size, the distance between the two countries, and the size of the trade flow. Anderson (1979) improved this model by differentiating products by country of origin. Bergstrand (1985) further argued that the gravity model works under the condition of monopolistic competition. Consumers of the same country prefer different products due to the difference in taste preferences. Deardorff & Stern (1998) proposed a generalized model showing that dependent and independent variables affect the volume of exports. Dependent variables are the variables which the country can influence. These are the GDP size of the interacting countries and the bilateral trade cost. At the same time, the level of world liberalization is an example of a variable which the country cannot influence. From this standpoint, it is possible to argue that trading partners cannot influence the inclusion in the Russian list of unfriendly countries. At the same time, like an import ban, an unfriendly list represents a proxy for increased trade costs which naturally negatively influence trade flows.

One of the main issues of the gravity model is variables that are not directly observable. One of the possible solutions is to use ordinary least squares (OLS) with fixed effects. (Rose & van Wincoop, 2001; Feenstra, 2015; Baldwin and Taglioni, 2006). Using OLS with fixed effects allows for an estimation of the coefficients for variables that cannot be measured or included in the model (Andersson, 2019). OLS with fixed effects takes into account non-observed variables which are specific to each individual country. The 'within-group estimation' method can be used to separate the unobservable variable from the error term. Using Least Square Dummy Variable (LSDV) method is the way to inject dummy variables for country or time (García et al., 2013; Umar et al., 2020). LSDV allows to eliminate the unobservable and time-invariant effect, which differs for each country.

Mátyás (1997) states that dummy variables should be created for import and export. Such variables could be stated for the financial crisis, trade barriers, global inflation, and physical phenomena (Adam & Cobham, 2007). Egger & Nigai (2015) and Baldwin & Taglioni (2007) propose simultaneously adding dummy country-time effects and time-invariant country-pair effects for import and export. Such variables make it possible to consider the most unobservable and time-varying conditions when a country joins a trade union. However, Baier & Bergstrand (2007) argues that dummy variables do not solve the endogeneity problem in importers and exporters having personal preferences to trade with a particular country. Shepherd (2012) suggests using a dummy variable Policy in the gravity model. He argues that the policies followed by the country in the past affect the country's attitude towards international trade. Anderson and van Wincoop (2004) suggested to include a dummy for unobservable quantitative variables. Presence in the unfriendly list and import ban are examples of time-invariant effects, which can be captured by adding corresponding dummy variables in the model. Similar to policy variable, dummy variables for unfriendliness and import ban captures not only the present state of policies followed by the trading partner but also the policies followed in the past.

Thus, based on the existing literature on gravity models, trade costs of trade can be captured using dummy variables for the presence of a common border, common language, colonial past, participation in a regional trade agreement and/or access to the sea. The cost of transporting goods between countries is expressed in the distance between countries. Another possible solution is using the history variable instead of the common language variable (Troekurova & Pelevina, 2014). The history variable helps to evaluate the joint experience of interaction between countries.

Sen (1986) compares the application of the OLS gravity model and the maximum likelihood estimation of the gravity model. Both methods give approximately the same results and can be used to validate the model further. Stack (2009) argues that using panel data allows for the derivation of heterogeneity in a gravity model. The random effects OLS is often used for gravity models as well (Lee & Park, 2007). However, OLS with fixed effects is considered to be better because the unobservable model variables correlate with the underlying model variables and thus distort the model in random effects OLS.

3. METHODOLOGY

The research involves the dataset with the data about exports of agricultural products from all trading partners of Russia for ten years. The data source is the UN COMTRADE, World Bank database for the period of 2009-2019. The data was under cleaning process and check for normality. The data was transformed into the constant price using the annual producer price index from FAOSTAT for import and export trade flow and constant prices GDP to eliminate inflation's influence. The gravity model was estimated using several techniques as a robustness check.

The suggested model shows dependence between import, export, the Russian GDP, the GDP of trading partner, the distance between countries and the dummy variables (a common boarder, a common history, availability of seaports, participation in EU, presence in the unfriendly list and Russian import ban). Our research built a gravity model based on Anderson and van Wincoop (2004). General specification of the model is following:

$$\widetilde{Y}_{ij} = \beta_0 + \beta_1 gdpru + \beta_2 gdppartner_c + \beta_3 dist_c + \beta_4 sea_c + \beta_5 eu_c + \beta_6 unfr_c + \beta_7 ban_c + \varepsilon_{ij} \quad (1)$$

where \widetilde{Y}_{ij} - export from country c to Russia; c - denotes a country (trading partner); $dist_c$ - distance between capitals of countries and Russia; sea_c - dummy for seaports; eu_c - membership of the trading partner in the EU; $unfr_c$ - denotes whether the trading partner is the Russian list of unfriendly countries, ban_c - dummy for Russian import ban; $gdpru$ - Russian GDP; $gdppartner_c$ - GDP of trading partner; β - regression coefficients; ε_{ij} - error term.

It should be noted that variable $dist_c$ is the distance between the capital of each country and Moscow, excluding Finland, Estonia, Latvia, Sweden, for which the distance between the capital and Saint-Petersburg is taken. Export flow data is measured in thousand US dollars taken from UN COMTRADE (2021) and deflated.

Dummy variables used in the model follows the usual logic. Variable sea_c indicates access to the sea. Commercial shipping by sea is several times cheaper than shipping by air or by land, and therefore it should reduce the country's trade costs significantly. We use this variable as a proxy for the country's landlocked status, which is one of the standard features of the gravity models (Olivero & Yotov, 2012). Variable ban_c has a value of 1 for the years after 2014, as all countries in the scope of Russian import ban are in the dataset. Variable $unfr_c$ captures the effect of a trading partner's presence in the Russian list of unfriendly countries. If a country is present in the list, this variable equals to 1 for all years in the dataset. This is done intentionally to capture the effect of long-term trade relations and compare it to the presence of the Russian import ban, whose coverage is similar to the list of unfriendliness, with some minor exceptions. Under this specification, it is possible to test the comparative magnitude of import ban and inclusion in the unfriendly list, and at the same time determine the fixed effect attributable to the group of countries included into the unfriendly list.

It should be noted that studies that employ gravity models frequently contain a variable capturing the colonial past of the trading partners (see for example, Carrere, 2006). At the same time, there is a need to capture the effects of higher trade creation due to established trade connections or the absence of this effect due to distant connections between countries. The variable for unfriendliness captures the effect of trade creation associated with the group of countries included in the unfriendly list.

Several limitations of the model (1) should be noted. The variables are too quantitatively different from each other. For example, variable $dist_c$ ranges within [300: 3000], while the GDP variable can reach 5 million. This problem is addressed by taking the logarithm of the variables (Deardorff & Stern, 1998). Regression coefficients can be interpreted as elasticities by taking the logarithm on both sides of the equation. In this case, the log-log model is as follows:

$$\ln \widetilde{Y}_{ij} = \beta_0 + \beta_1 \ln gdpru + \beta_2 \ln gdppartner_c + \beta_3 \ln dist_c + \beta_4 sea_c + \beta_5 eu_c + \beta_6 unfr_c + \beta_7 ban_c + \varepsilon_{ij} \quad (2)$$

Another common issue of the gravity models is data heterogeneity among countries. One of the possible solutions could be using the panel data and generalized least squares (GLS) estimation method.

Descriptive statistics of the dataset are shown in Table 1. The dataset includes export flows from trading partners to Russia for main agri-food products in the scope of the Russian import ban (milk, meat, fish, vegetables, and fruits).

Additionally, Appendix 1 outlines the countries included in the Russian list of unfriendly countries, while Appendix 2 shows the list of countries in the scope of the Russian import ban.

Table 1

Dataset descriptive statistics

Variable	N	Average	Std. Dev.	Min	Max
EU	8,385.00	0.21	0.41	0.00	1.00
Sea Port	8,385.00	0.79	0.41	0.00	1.00
Ban	8,385.00	0.16	0.37	0.00	1.00
Unfriendliness	8,385.00	0.32	0.47	0.00	1.00
Distance	8,385.00	5,435.46	3,800.56	675.12	16,547.47
GDP RU mln \$	8,385.00	3,748.62	213.50	3,275.45	4,080.29
GDP partner mln \$	8,385.00	827.84	2,435.18	0.00	24,861.34
Export thou \$	8,385.00	20.49	112.60	0.00	2,699.35

Source: UN COMTRADE database, own calculations.

Existing literature on the estimation of gravity model coefficients shows widespread usage of the pooled OLS method. However, in case of the gravity model, estimators stemming from this approach do not meet the requirements of BLUE (best linear unbiased estimated) and are therefore biased. Building the gravity model using pooled OLS is susceptible to endogeneity, heteroskedasticity and autocorrelation effects. As a robustness check, we use various estimations of gravity model coefficients. A summary of used estimation techniques is presented in Table 2. The table also shows several tests applied to choose the most appropriate method.

Table 2

Applied tests

Model 1	Model 2	Model 3
Gravity Panel, Random GLS	Gravity Panel, Random ML	Gravity Panel, Fixed effect model
Test Comparison		Omitted variables
Breusch-Pagan – model 1 is chosen as best according test		Model excluded

4. EMPIRICAL RESULTS AND DISCUSSION

Estimation of the gravity model equations using selected techniques has shown several important results. The results of models' estimation are shown in Table 3. Russian GDP is negatively associated with export from trading partners in simple regression and robust simple regression, while partner GDP is positively associated with exports. At the same time, magnitudes are small, which might justify the choice of another estimation technique. The direction of the seaport effect is also expected, as this variable is often used to capture the effect of landlocked country (Olivero & Yotov, 2012). Products in the scope of the Russian import ban were frequently not originated from landlocked countries; therefore, the presence of a seaport did not compensate the negative effect of the ban.

Table 3

GLS and ML models of export to Russia from trading partners

Variables	Gravity Panel, Random GLS	Gravity Panel, Random ML	Gravity Panel, Fixed
Seaport	-1.093*** (0.172)	-1.102*** (0.172)	-1.111*** (0.172)
Unfriendliness	0.392** (0.163)	0.363** (0.165)	0.336** (0.166)
Ban	-2.663*** (0.215)	-2.625*** (0.222)	-2.588*** (0.228)
ln(GDP RU)	2.414 (1.683)	2.315 (2.406)	
ln(GDP Partner)	0.642*** (0.0406)	0.643*** (0.0405)	0.644*** (0.0406)
ln(Distance)	-0.642*** (0.0858)	-0.639*** (0.0857)	-0.636*** (0.0858)
constant	-16.95 (13.81)	-16.16 (19.75)	2.847*** (0.674)
Observations	3,497	3,497	3,497

Source: UN COMTRADE database, own calculations.

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Switching to other estimation techniques shows expected results for Russian GDP and partner GDP when both variables positively affect the export of selected agri-food products. Interestingly, partner GDP has higher significance than Russian GDP, albeit lower magnitude, in describing export flows. Distance has an apparent and expected negative effect on exports, i.e., distant countries from Russia tend to export fewer agri-food products. In log-log version of the model, the effect of distance (-0.6%) is exactly mitigated by the effect of partner GDP (0.6%).

Unfriendliness and ban are statistically significant; however, they show different directions of effect. This fact shows that countries that were included in the unfriendly list have shown positive dynamics in selected agri-food product exports to Russia during the last ten years; however, these exports were under significant negative influence from the Russian import ban in the period when it was in effect. From this point of view, the Russian import ban has already taken the toll on the exports of these products. Therefore any potential additional retaliatory measure of Russia would have limited effect. In simple terms, Russia has already used its weapon to respond to its biggest exporters of these agri-food products. As was mentioned by Bělín and Hanousek (2021), the Russian import ban had a higher impact than a restriction on the export of oil extraction and military equipment to Russia; however, comparison to the estimated unfriendliness effect leads to the conclusion that the effect has been already fully used.

Based on the estimated effect of the unfriendly list and the Russian import ban, it is possible to conclude that the choice of countries to be included in the list has not been made based on the potential adverse effect on the target. Estimated effects suggest that countries were selected to minimize adverse effects on the sender, i.e., Russia itself. Similar reasoning was described by Hedberg (2018) concerning the Russian import ban. As stated by the author, Russian authorities crafted the import ban to impact one group of countries more than others. In other words, the import ban was a strategy of differentiated retaliation. The fact that the unfriendly countries' list resembles the import ban list supports this statement.

Comparison of the relatively low magnitude of the estimated unfriendliness effect to the Russian import ban effect also supports the statement that trading partners of Russia are capable of relatively quickly re-routing trading flows from the Russian market to other markets (as was the case after the import ban was imposed), which will allow the effect of the unfriendliness to be limited similar to import ban effect (Uzun & Loginova, 2016).

A comparison of the unfriendly list and list of countries in the scope of the Russian import ban shows that only six countries (Switzerland, Japan, South Korea, Northern Macedonia, New Zealand, Singapore) are present in the former but not in the latter. The estimated magnitude of the unfriendliness effect shows that the addition of these countries did not offset the effect of the import ban, which was already imposed on the original list of countries. As the coefficient for unfriendliness also captures the effect of established trade connections, this supports the statement that these countries were not among the main trading partners for Russia in selected agri-food products.

5. CONCLUSION

The scope of the Russian import ban and the list of unfriendly countries are very close. The import ban was introduced in 2014, initially for one year, but has been prolonged yearly since then. The list of unfriendly countries may somewhat replace the import ban regulation. Legal possibilities imposed on the Russian Government by acts related to unfriendly countries provide it with the same power level as the import ban. It is probable that the government will use this vehicle further and might extend the list of goods or services and countries or territories in future as a response to new economic restrictions imposed on Russia. At the same time, the estimated effect shows that the capacity of Russia to retaliate in terms of agri-food products is very limited. Most of this effect was already used in 2014 and affected parties have re-

routed trade flows and adapted to these measures. Based on this experience, there is a low probability of Russian sanctions related to agri-food originating in Western countries. However, other types of goods or services might be targeted by Russia in the future.

It is important to mention a limitation of this conclusion. As current analysis is based on the comparison of the Russian import ban and a list of unfriendly countries, the estimation is done for the selected agri-food products in scope of the import ban. The addition of other products in the analysis is not currently possible due to absence of statistical data and can only be done in future studies. It is not possible to conclude about the effects of an unfriendly list for other groups of products. Due to the lack of economic pressure, which Russia can impose in terms of agri-food products, the Russian government might still exercise retaliatory measures for other groups of goods or services originating from Western countries; however, the timing of such measure would play a key role, as the range of such goods and services are shrinking due to the fact, that some of the western companies withdraw from the Russian market.

ACKNOWLEDGEMENT

This paper is a partial result of research project No. 2021A0010 - Challenges and opportunities in agricultural trade for EAEU countries in the context of sanctions, supported by the Internal Grant Agency (IGA) of the Faculty of Economics and Management, CULS Prague.

REFERENCES

- Abdulwakil, M. M., Abdul-Rahim, A. S., & Alsaleh, M. (2020). Bioenergy efficiency change and its determinants in EU-28 region: evidence using least square dummy variable corrected estimation. *Biomass and Bioenergy*, 137, 105569.
- Adam, C., & Cobham, D. (2007). Modelling multilateral trade resistance in a gravity model with exchange rate regimes. In *Centre for dynamic macroeconomic analysis conference papers*.
- Afesorgbor, S. K. (2019). The impact of economic sanctions on international trade: How do threatened sanctions compare with imposed sanctions?. *European Journal of Political Economy*, 56, 11-26.
- Anderson, J. E., & Van Wincoop, E. (2004). Trade costs. *Journal of Economic Literature*, 42(3), 691-751.
- Anderson, J. E. (1979). A theoretical foundation for the gravity equation. *The American economic review*, 69(1), 106-116.
- Andersson, A. (2019). The trade effect of private standards. *European Review of Agricultural Economics*, 46(2), 267-290.
- Babula, R., Langley, S. V., Somwaru, A., & Makki, S. S. (2005). Using directed acyclic graphs and VAR econometrics to simulate the upstream and downstream effects of imposition of an import quota: an application to US wheat-related markets. *Quantitative Measures for Assessing the Effect of Non-Tariff Measures and Trade Facilitation, Singapore: World Scientific Ltd. for APEC*, 193-215.
- Baier, S. L., & Bergstrand, J. H. (2007). Do free trade agreements actually increase members' international trade?. *Journal of International Economics*, 71(1), 72-95.
- Baldwin, R., & Taglioni, D. (2006). Gravity for dummies and dummies for gravity equations. *National Bureau of Economic Research Working Paper* 12516.
- Baldwin, R., & Taglioni, D. (2007). Trade effects of the euro: A comparison of estimators. *Journal of Economic Integration*, 780-818.
- Bělin, M., & Hanousek, J. (2021). Which sanctions matter? Analysis of the EU/Russian sanctions of 2014. *Journal of Comparative Economics*, 49(1), 244-257.
- Bergstrand, J. H. (1985). The gravity equation in international trade: some microeconomic foundations and empirical evidence. *The Review of Economics and Statistics*, 67(3), 474-481.
- Boero, R., Edwards, B., & Rivera, M. (2018). Regional input-output tables and trade flows: An integrated and interregional non-survey approach. *Regional Studies*, 52(2), 225-238.

- Boulanger, P., Dudu, H., Ferrari, E., & Philippidis, G. (2016). Russian roulette at the trade table: a specific factors CGE analysis of an agri-food import ban. *Journal of Agricultural Economics*, 67(2), 272-291.
- Brun, J.F.; Carrere, C.; Guillaumont, P. & de Melo, J. (2005). Has distance died? Evidence from a panel gravity model. *World Bank Economic Review*, 19(1), 99-120
- Carrere, C. (2006). Revisiting the effects of regional trade agreements on trade flows with proper specification of the gravity model. *European Economic Review*, 50(2), 223-247.
- Cepeda-López, F., Gamboa-Estrada, F., León, C., & Rincón-Castro, H. (2019). The evolution of world trade from 1995 to 2014: A network approach. *The Journal of International Trade & Economic Development*, 28(4), 452-485.
- Cheptea, A., & Gaigné, C. (2020). Russian food embargo and the lost trade. *European Review of Agricultural Economics*, 47(2), 684-718.
- Cho, G., Sheldon, I. M., & McCorrison, S. (2002). Exchange rate uncertainty and agricultural trade. *American Journal of Agricultural Economics*, 84(4), 931-942.
- Czermińska, M. (2022). New-generation trade agreement with Japan: Significance to EU Companies. *International Entrepreneurship Review*, 8(4), 41-55. <https://doi.org/10.15678/IER.2022.0804.03>
- Dal Bianco, A., Boatto, V. L., Caracciolo, F., & Santeramo, F. G. (2016). Tariffs and non-tariff frictions in the world wine trade. *European Review of Agricultural Economics*, 43(1), 31-57.
- Deardorff, A. V., & Stern, R. M. (1998). *Measurement of nontariff barriers* (Vol. 179). University of Michigan Press.
- Distefano, T., Tuninetti, M., Laio, F., & Ridolfi, L. (2020). Tools for reconstructing the bilateral trade network: a critical assessment. *Economic Systems Research*, 32(3), 378-394.
- Dong, Y., & Li, C. (2018). Economic sanction games among the US, the EU and Russia: Payoffs and potential effects. *Economic Modelling*, 73, 117-128.
- Dreger, C., Kholodilin, K., Ulbricht, D., & Fidrmuc, J. (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.
- Early, B.R. (2015). *Busted Sanctions: Explaining Why Economic Sanctions Fail*. Redwood City, CA: Stanford University Press.
- Egger, P. H., & Nigai, S. (2015). Structural gravity with dummies only: Constrained ANOVA-type estimation of gravity models. *Journal of International Economics*, 97(1), 86-99.
- Ehrich, M., & Mangelsdorf, A. (2018). The role of private standards for manufactured food exports from developing countries. *World Development*, 101, 16-27.
- Emlinger, C., Jacquet, F., & Lozza, E. C. (2008). Tariffs and other trade costs: assessing obstacles to Mediterranean countries' access to EU-15 fruit and vegetable markets. *European Review of Agricultural Economics*, 35(4), 409-438.
- Esfahani, M. N., & Rasoulinezhad, E. (2017). Iran's trade policy of Asianization and de-Europeanization under sanctions. *Journal of Economic Studies*, 44(4), 552-567.
- European Commission (2019). *Russian Import Ban on EU Products. Food Safety*. Available at: https://ec.europa.eu/food/safety/international_affairs/eu_russia/russian_import_ban_eu_products_en.
- Fagiolo, G., Reyes, J., & Schiavo, S. (2010). The evolution of the world trade web: a weighted-network analysis. *Journal of Evolutionary Economics*, 20(4), 479-514.
- Feenstra, R. C. (2015). *Advanced international trade: theory and evidence*. Princeton university press.
- Fedoseeva, S. & Herrmann, R. (2019) The price of sanctions: An empirical analysis of German export losses due to the Russian agricultural ban. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, 1-15, <https://doi.org/10.1111/cjag.12194>.
- Felbermayr, G., Kirilakha, A., Syropoulos, C., Yalcin, E., & Yotov, Y. (2020). The Global Sanctions Data Base. *European Economic Review*, 129, 103561.
- Ferguson, S. M., & Gars, J. (2020). Measuring the impact of agricultural production shocks on international trade flows. *European Review of Agricultural Economics*, 47(3), 1094-1132.
- Ferro, E., Otsuki, T., & Wilson, J. S. (2015). The effect of product standards on agricultural exports. *Food Policy*, 50, 68-79.
- Fournier Gabela, J. G. (2020). On the accuracy of gravity-RAS approaches used for inter-regional trade estimation: evidence using the 2005 inter-regional input-output table of Japan. *Economic Systems Research*, 32(4), 521-539.
- García, E. C., Navarro Pabsdorf, M., & Gómez Herrera, E. (2013). The gravity model analysis: an application on MERCOSUR trade flows. *Journal of Economic Policy Reform*, 16(4), 336-348.

- Gervais, A. (2018). Uncertainty, risk aversion and international trade. *Journal of International Economics*, 115, 145-158.
- Government of the Russian Federation (2021). *Decree of the Government of the Russian Federation dated May 13, 2021 No. 1230-r*. Available at: <http://publication.pravo.gov.ru/Document/View/0001202105140026>
- Government of the Russian Federation (2022). *Decree of the Government of the Russian Federation dated March 5, 2022 No. 430-r*. Available at: <http://static.government.ru/media/files/wj1HD7RqdPSxAmDlaisqG2zugWdz8Vc1.pdf>
- Grant, J. H., & Lambert, D. M. (2008). Do regional trade agreements increase members' agricultural trade?. *American Journal of Agricultural Economics*, 90(3), 765-782.
- Hajdukiewicz, A., & Pera, B. (2021). Factors affecting the choice of Incoterms: The case of companies operating in Poland. *International Entrepreneurship Review*, 7(4), 35-50. <https://doi.org/10.15678/IER.2021.0704.03>
- Hedberg, M. (2018). The target strikes back: explaining countersanctions and Russia's strategy of differentiated retaliation, *Post-Soviet Affairs*, 34(1): 35-54, DOI: 10.1080/1060586X.2018.1419623
- Hufbauer, G.C., Schott, J.J., & Elliott, K.A. (1990). *Economic Sanctions Reconsidered: History and Current Policy*. Washington, DC: Peterson Institute for International Economics.
- Horská, E., Moroz, S., & Palkovič, J. (2023). Determinants of export activities in Ukrainian regions in the pre-conflict and the first-stage conflict periods. *Entrepreneurial Business and Economics Review*, 11(1), 181-198. <https://doi.org/10.15678/EBER.2023.110110>
- Kholodilin, K. A., & Netšunajev, A. (2019). Crimea and punishment: the impact of sanctions on Russian economy and economies of the euro area. *Baltic Journal of Economics*, 19(1), 39-51.
- Koo, W. W., Karemera, D., & Taylor, R. (1994). A gravity model analysis of meat trade policies. *Agricultural Economics*, 10(1), 81-88.
- Lee, H., & Park, I. (2007). In search of optimised regional trade agreements and applications to East Asia. *World Economy*, 30(5), 783-806.
- Liefert, W. M., Liefert, O., Seeley, R., Lee, T. (2019) The effect of Russia's economic crisis and import ban on its agricultural and food sector. *Journal of Eurasian Studies*, 10(2), 119-135, <https://doi.org/https://doi.org/10.1177/1879366519840185>.
- Liefert, W.M., & Liefert, O. (2015). Russia's economic crisis and its agricultural and food economy. *Choices*, 30(1), 1-6.
- Maciejewski, M., & Wach, K. (2019). What determines export structure in the EU countries? The use of gravity model in international trade based on the panel data for the years 1995-2015. *Journal of International Studies*, 12(1), 151-167. <https://doi.org/10.14254/2071-8330.2019/12-1/10>
- Mátyás, L. (1997). Proper econometric specification of the gravity model. *World Economy*, 20(3), 363-368.
- Melo, O., Engler, A., Nahuehual, L., Cofre, G., & Barrena, J. (2014). Do sanitary, phytosanitary, and quality-related standards affect international trade? Evidence from Chilean fruit exports. *World Development*, 54, 350-359.
- Umar, Y.H., Muhammad, B., Omoren, U. (2020) Panel Data Analysis of International Trade in West African Sub Region. *American Journal of Theoretical and Applied Statistics*, 9(4): 106-120. doi: 10.11648/j.ajtas.20200904.14
- Narayan, S., & Nguyen, T. T. (2016). Does the trade gravity model depend on trading partners? Some evidence from Vietnam and her 54 trading partners. *International Review of Economics & Finance*, 41, 220-237.
- Natale, F., Borrello, A., & Motova, A. (2015). Analysis of the determinants of international seafood trade using a gravity model. *Marine Policy*, 60, 98-106.
- Niepmann, F., & Schmidt-Eisenlohr, T. (2017). International trade, risk and the role of banks. *Journal of International Economics*, 107, 111-126.
- Oguledo, V., & MacPhee, C. R. (1994). Gravity models: a reformulation and an application to discriminatory trade arrangements. *Applied Economics*, 26(2), 107-120.
- Olivero, M. P., & Yotov, Y. V. (2012). Dynamic gravity: endogenous country size and asset accumulation. *Canadian Journal of Economics/Revue canadienne d'économique*, 45(1), 64-92.
- Olper, A., & Raimondi, V. (2008). Agricultural market integration in the OECD: A gravity-border effect approach. *Food Policy*, 33(2), 165-175.
- President of the Russian Federation (2018). *Federal Law No. 127-FZ dated June 4, 2018*. Available at: <http://publication.pravo.gov.ru/Document/View/0001201806040032>.
- Ravishankar, G., & Stack, M. M. (2014). The Gravity Model and Trade Efficiency: A Stochastic Frontier Analysis of Eastern European Countries' Potential Trade. *The World Economy*, 37(5), 690-704.

- Romashkin, R., Kiselev, S., & Resmyatova, A. (2020). The impact of Russian food embargo and export promotion policy on agri-food trade between the EU and the EEU. In *Proceedings of the 29th International Scientific Conference "Agrarian Perspectives XXIX: Trends and Challenges of Agrarian Sector"*. Prague: Czech University of Life Sciences Prague.
- Rose, A. K., & Van Wincoop, E. (2001). National money as a barrier to international trade: The real case for currency union. *American Economic Review*, 91(2), 386-390.
- Rymarczyk, J. (2021). The impact of industrial revolution 4.0 on international trade. *Entrepreneurial Business and Economics Review*, 9(1), 105-117. <https://doi.org/10.15678/EBER.2021.090107>
- Sen, A. (1986). Maximum likelihood estimation of gravity model parameters. *Journal of Regional Science*, 26(3), 461-474.
- Shepherd, B. (2012). *The gravity model of international trade: A user guide*. ARTNeT Books and Research Reports. 2012
- Shepherd, B., & Wilson, N. L. (2013). Product standards and developing country agricultural exports: The case of the European Union. *Food Policy*, 42, 1-10.
- Stack, M. M. (2009). Regional integration and trade: Controlling for varying degrees of heterogeneity in the gravity model. *World Economy*, 32(5), 772-789.
- Tinbergen, J. (1962). *Shaping the world economy: suggestions for an international economic policy*. Twentieth Century Fund.
- Troekurova, I., & Pelevina, K. (2014). Gravity Models of Foreign Trade of Brics Countries. *Bulleten Saratov University*, 5(100), 133-142.
- UN COMTRADE (2021). *International trade statistics database*. Available at: <https://comtrade.un.org/>.
- Uzun, V., & Loginova, D. (2016). Russian Food Embargo: Minor Losses in Western Countries. *Russian Economic Developments*, 9, 32-37.
- Yang, S., & Martinez-Zarzoso, I. (2014). A panel data analysis of trade creation and trade diversion effects: The case of ASEAN-China Free Trade Area. *China Economic Review*, 29, 138-151.
- Yurik, S., Pushkin, N., Yurik, V., Halík, J., & Smutka, L. (2020). Analysis of Czech Agricultural Exports to Russia Using Mirror Statistics. *Entrepreneurial Business and Economics Review*, 8(2), 27-46. <https://doi.org/10.15678/EBER.2020.080202>
- Wach, K., & Wojciechowski, L. (2014). The factors of outward FDI from V4 countries from the perspective of the EU and the EMU membership: A panel gravity model approach. *Acta Universitatis Lodzianis Folia Oeconomica*, 5(307), 157-170
- Wei, G., Huang, J., & Yang, J. (2012). The impacts of food safety standards on China's tea exports. *China Economic Review*, 23(2), 253-264.
- Wengle, S. (2016) The domestic effects of the Russian food embargo. *Demokratizatsiya*, 24(3): 281-289.
- World Bank (2021). *World Bank Open Data*. Available at: <https://data.worldbank.org/>.

Appendix 1

List of unfriendly countries maintained by Russian Federation

N	Country	Code	Effective in year
1	Albania	ALB	2022
2	Australia	AUS	2022
3	Austria	AUT	2022
4	Belgium	BEL	2022
5	Bulgaria	BGR	2022
6	Canada	CAN	2022
7	Switzerland	CHE	2022
8	Cyprus	CYP	2022
9	Czech Republic	CZE	2021
10	Germany	DEU	2022
11	Denmark	DNK	2022
12	Spain	ESP	2022
13	Estonia	EST	2022
14	Finland	FIN	2022
15	France	FRA	2022
16	Great Britain	GBR	2022
17	Greece	GRC	2022
18	Croatia	HRV	2022
19	Hungary	HUN	2022
20	Ireland	IRL	2022
21	Iceland	ISL	2022
22	Italy	ITA	2022
23	Japan	JPN	2022
24	South Korea	KOR	2022
25	Lithuania	LTU	2022
26	Luxemburg	LUX	2022
27	Latvia	LVA	2022
28	North Macedonia	MKD	2022
29	Montenegro	MNE	2022
30	the Netherlands	NLD	2022
31	Norway	NOR	2022
32	New Zealand	NZL	2022
33	Poland	POL	2022
34	Portugal	PRT	2022
35	Romania	ROU	2022
36	Singapore	SGP	2022
37	Slovakia	SVK	2022
38	Slovenia	SVN	2022
39	Sweden	SWE	2022
40	Ukraine	UKR	2022
41	United States of America	USA	2021

Appendix 2

List of countries in scope of Russian import ban

N	Country	Code	Effective in year
1	Albania	ALB	2015
2	Austria	AUT	2014
3	Belgium	BEL	2014
4	Bulgaria	BGR	2014
5	Cyprus	CYP	2014
6	Czech Republic	CZE	2014
7	Germany	DEU	2014
8	Denmark	DNK	2014
9	Spain	ESP	2014
10	Estonia	EST	2014
11	Finland	FIN	2014
12	France	FRA	2014
13	Great Britain	GBR	2014
14	Greece	GRC	2014
15	Croatia	HRV	2014
16	Hungary	HUN	2014
17	Ireland	IRL	2014
18	Iceland	ISL	2015
19	Italy	ITA	2014
20	Lithuania	LTU	2014
21	Luxemburg	LUX	2014
22	Latvia	LVA	2014
23	Montenegro	MNE	2015
24	the Netherlands	NLD	2014
25	Norway	NOR	2014
26	Poland	POL	2014
27	Portugal	PRT	2014
28	Romania	ROU	2014
29	Slovakia	SVK	2014
30	Slovenia	SVN	2014
31	Sweden	SWE	2014
32	United States of America	USA	2014
33	Australia	AUS	2014
34	Canada	CAN	2014
35	Ukraine	UKR	2016