LUND UNIVERSITY
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Escaping Sanctions by Trade Diverting

Abstract

Sanctions are one of the main policy tools used in order change behaviour of countries involved in conflicts, without using armed forces. This paper examines the possibility for a targeted country to escape the potential negative effects from sanctions by increasing trade with third countries that has not imposed sanctions. The analysis is carried out on the specific case of the sanctions against Russia that was imposed by several countries and institutions as a reaction to the Russia-Ukraine conflict regarding Crimea. The paper analyse the effects of these sanctions by empirically estimate Russian exports between the years 2007-2015. The estimations are performed with different specifications of a gravity model, where bilateral exports between Russia and the importing country is the dependent variable and variations of country specific characteristics are used as explanatory variables. The results are threefold, as Russia's *(i)* overall exports to the rest of the world decrease when targeted with sanctions, *(ii)* exports to sanctioning countries decreased more than the rest of the world and *(iii)* exports to countries similar to the sanctioning countries have not decreased.

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Preface

This paper will conclude my MSc. in Business and Economics at Lund University. All research and work on this thesis has been carried out in the spring semester of 2017.

As this is my last essay on Lund University I would like to express my gratitude towards Maria Persson, who has been my advisor on all three theses during my education. I value her help and advice highly, where I feel that I have been able to utilise from her experience and knowledge in full. She has always taken the time, providing me with (a lot) of feedback; something that I am sure of has improved both my understanding in the field as well as my papers.

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1. Introduction

How do war and conflicts affect global well-established economic relations and trade flows? Obviously, the relation between parties directly involved in a conflict is not flourishing, but the question can also be considered in a broader perspective. With conflicts affecting both the people living in the conflicted area as well as third parties, measures are often taken by the outside world with the intent of ending the dispute. The most established policy tool for non-military interventions in conflicts today is imposition of a sanction on the country that is considered to be errant.

A sanction is a comprehensive policy tool that targets several different areas, most common are travel-bans, asset freezing and embargoes that aim to isolate the targeted country from the surrounding world (United Nations Security Council, 2013). As practically no country with growth objectives can be self sufficient in the prevailing globalised and integrated economic environment, the world can be seen as a network characterised by different degrees of mutual dependence between countries. To put this in a trade perspective, there are a number of levels to regard beyond the actual traded goods where the mutual dependence applies. Trade concerns not only the producer of the good and the buying firm, but there are financial institutions, border procedures as well as the involved managers and workers. Sanctions targeting several of these levels could thus be imposed to affect the targeted country to such extent that it considers it absolutely necessary to solve the conflict. However, if the entire outside world does not jointly impose sanctions, there will be opportunities for the targeted country to shift its established trade to other countries. Assuming that the targeted country succeeds with the trade diversion implies that the new[1] trade partners have instead benefited from the imposed sanctions, creating an interesting question of why these particular countries benefited. In an international trade related view, the perspective of third party countries benefiting from imposed sanctions is worth examining further. This is interesting in a general aspect, and to analyse it further it can be applied to actual events and sanctions. The current situation in the world is such that Russia, a major country and economic force, have recently had sanctions imposed on them. Considering Russia's size and impact on the world economy, it is not unlikely that the sanctions could affect other parties as well. The situation on the

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[1] These trade partners are not necessarily completely new per se, but can be considered new in a perspective of increased magnitude of trade flow relative to before the sanctions.

Russia-Ukraine conflict is such that most of the western countries[2] have mutually imposed sanctions on Russia whereas the rest of the world has not. There are various expected economic effects of sanctions, both for the imposing country itself and more intuitively, for the targeted country. The conflict has put the Russian economy in a recession and both imports and exports have fallen since (Russell, 2015). Considering this situation and the fact that the sanctions have recently been prolonged (Council of the European Union, 2017), it could be crucial for Russia to break this negative trend and start to generate economic growth again. One alternative would be for Russia to seek alternative export markets so they can keep, or at least diminish the decrease in domestic production. As an example, the EU pursued this strategy immediately as the sanctions were imposed in order to compensate for the loss of exports to Russia, successfully keeping the export losses from the sanctions at only 0.3% and 0.4% in 2014 and 2015 (Szczepański, 2015).

On these prerequisites, this paper will examine the effects the sanctions have on trade flows, by aiming attention to the specific case of the Russian sanctions. The effects will be estimated both in an elementary view that investigates the direct consequences for Russia but also, in line with the discussion above, through a more sophisticated analysis regarding how diverting trade to other export markets could affect the overall impact of being targeted with sanctions. The questions of research will therefor be stated as:

   i)   *Has Russia's bilateral exports been affected by the sanctions following the Ukraine conflict?*
   ii)   *Can a country that is being targeted with sanctions decrease potential negative trade effects through trade with third countries?*

The rest of the paper is structured as follows: section 2 provides a thorough briefing of the state and objectives of sanctions as well as an outline over the events behind the imposed sanctions. Section 3 encounters for the previous research that has been conducted in the field, while section 4 will offer the theoretical foundation to economic theories as well as sanction- and trade specific theories. Section 5 describes the methods used to carry out the estimation of this paper and section 6 then gives an account for the results of the estimations along with several robustness tests. Section 7 will summarize and conclude the paper.

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[2] A list of countries that has imposed sanctions can be found in the appendix

2. Background

This section will start off by explaining the concept of sanctions, the different varieties of sanctions and how they can be used as well as what they can consist of. A historical perspective is also put on the subject with the intension of giving a picture of how, and in which situations, sanctions have been used up until today. This is followed by a review of the Russia-Ukraine conflict that aims to clear any uncertainties regarding the prevailing situation and the potential motives that each actor may have for taking measures against another as well as motives for not taking measures.

2.1. Sanctions

2.1.1. The Structure of a Sanction

A sanction is a measure to maintain or restore international peace and security without the use of armed forces (United Nations, 2015). In order to get a picture of how sanctions can be imposed and how a targeted country is affected, a horizontal and a vertical approach can be applied. The horizontal view regards the state of which the sanctions are imposed, where the vertical aspect regards what the imposed sanction consists of. Beginning with the horizontal point of view, sanctions can be either unilateral or multilateral. A unilateral sanction is a sanction imposed by a single country, where no other countries are behind the sanctions or joining them. As an example of how thus could appear, the United States imposed unilateral sanctions against Cuba, Iran and North Korea because these countries have adhered to policies that, according to the US, threaten US security interests (Kern, 2009).

A multilateral sanction is then, naturally, a sanction imposed by more than one country. It should be noted that it is not only countries that use this policy tool, organisations and institutions like the UN and EU can also impose sanctions. When they do the measures have to be applied by all member countries and thus, sanctions imposed by organisations are also considered multilateral. Many research papers have tried to determine which type of sanction is most effective (see Drezner, 2000, Bapat and Morgan, 2009 and Kim, 2013 among others), but the results are consistently inconclusive and as different studies have come to different answers there is no common agreement on one type of sanction that is considered to be superior. Intuitively, multilateral sanctions could be argued to have a larger effect that a unilateral, since it imposed by more countries and therefor is cutting off more of the targeted countries connection to the surrounding world, but this is not always the case. As a unilateral

sanction can cover exactly the areas the imposing country likes, a multilateral sanction could have problems reaching an as comprehensive solution since the wills of all included countries would need to be regarded (Bapat and Morgan, 2009). This could be linked back to the discussion on the inconclusive characteristic of the research, providing some understanding to the ambiguous conclusions on whether unilateral or multilateral sanctions are more effective.

In a historical perspective, unilateral sanctions were used more frequently during the major part of the 20th century, while the absence of multilateral sanctions increased with time, much due to the emergence of such organisations as the UN, EU and WTO. The first sanction implemented by the UN was in 1963 and was targeted against the apartheid regime in South Africa. Since then, the popularity of the policy tool has not cooled down and in 2013 the UN had 13 sanctions in force (United Nations Security Council, 2013). The EU has specified some examples of what their measures consists of when imposing a sanction. First of all, for a sanction to be imposed, a decision must be taken regarding the proposed sanction at the Common Foreign and Security Policy (CFSP) Council, where a unanimous voting gives the full legal effect to the sanction. Frequent measures that are often included are (Council of the European Union, 2014b):

- Arms embargo
- Asset Freeze
- Visa or travel ban

2.1.2 Purpose of Sanctions

First of all, sanctions are not intended to be considered as a purposeless punishment on an errant country, but rather as a measure to bring a change to the targeted country (Council of the European Union, 2014b). The distinction lies in the aim to provoke a long-term change in behaviour instead of just penalising the targeted country for the sake of it. An imposed sanction is then revised continuously where a decision to either lift the sanction or to prolong it is taken. On the 13th of March, EU's prevailing sanctions against Russia was prolonged six months in a review that also altered the composition of the sanction by removing two persons from the list of restricted persons and entities (Council of the European Union, 2017).

Continuing with a basic, but yet essential question: why are sanctions imposed? First, in the globalised and internationally connected world of today, a state of mutual dependency among countries has emerged. The reason for this is naturally because it is beneficial to do so,

countries are better of importing a good in which it does not have a comparative advantage to relative to another country than producing the good itself. Instead it is better to produce more of the good in which you do have a comparative advantage and export the surplus. This leads to a situation where both countries are better off when trading the abundant commodities with each other than what they would be in the autarky situation. If, hypothetically, the whole world would impose a comprehensive sanction on one single country, this would generate a situation where the whole outside world lives in the integrated state whereas the targeted country would appear in a suboptimal autarky situation of which it would not want to be. Thus, if the targeted country suffered enough losses it would need to change its original behaviour that generated the sanction such that the sanctions are lifted and the objective has been achieved. A more thorough approach will be also provided in the Theoretical Framework section of this paper
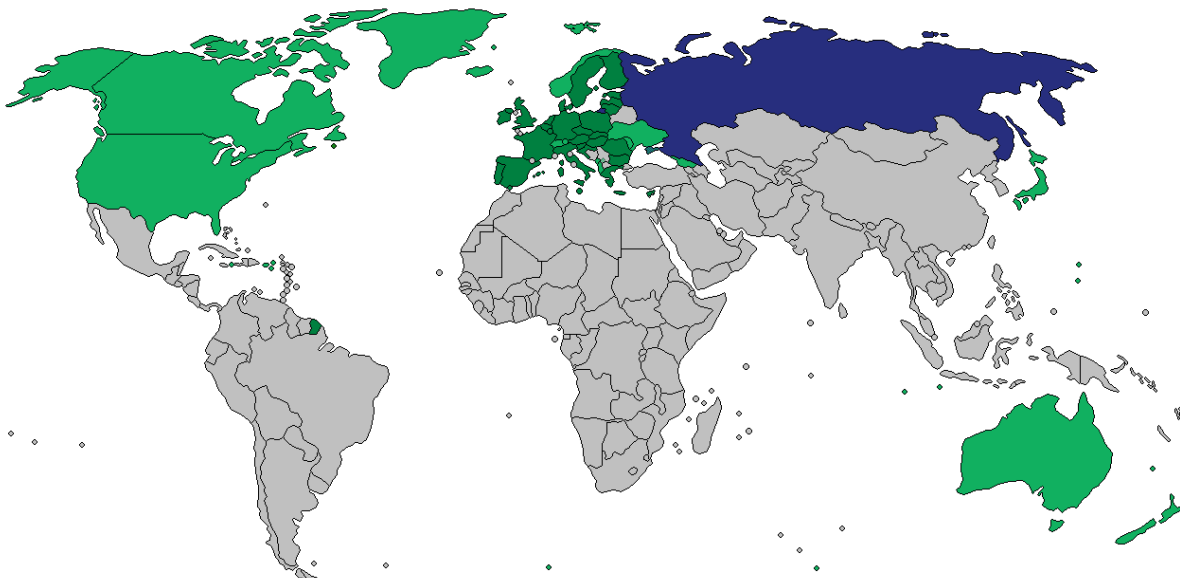
2.2. The Russian Sanctions

Finding Russia and Ukraine a couple of years into the conflict, the situation is as of the publication of this paper still complicated and there is yet no unity on the belongings of Crimea. As an example of the ambiguity today, in one end of the spectre the Russian Prime Minister in June 2105 said that Crimea had fully been integrated to the Russian Federation (International Business Times, 2015) and the other side the United Nations does not recognize this and still maps Crimea as a part of Ukraine territory. The dissonance can be argued to stem from the countries' relation reaching decades back, but the explicit schism is traced back to 2014.

The beginning of 2014 was a turbulent period in Ukraine building up to a revolt in Kiev, ousting president Viktor Yanukovich on February 22. The turn of events escalated rather quickly and the situation reached a peak of volatility on February 26, when pro-Russian and pro-Ukraine demonstrators clashing outside the parliament building in Crimea during a parliament meeting. The reason for the demonstrations stems from a referendum on Crimea's sovereignty that was to be held the same night, but the referendum was cancelled due to the events outside the building. However, this did not slow down the pace of events because the following morning, armed men seized the building and journalists were banned and lawmakers had their phones confiscated at the doors (Reuters, 2014). According to the parliaments webpage, a voting was held and a majority had voted for sovereignty of Crimea.

The legitimacy of the voting has been questioned, with voices being raised witnessing both fake and duplicated votes, in order to steer the result in the desired direction. The process to have Crimea joining the Russian Federation immediately followed and at March 16 a new voting was held, a voting in which great majority was in favour of joining Russia. On the other end, the Russian Parliament held another voting adopting a legislation making the annexation of Crimea easier.

The United States and other western countries were early very clear with its opinion on the events and actions being played out by Russia. The United States' President Barack Obama "emphasised that Russia's actions were in violation of Ukraine's sovereignty and territorial integrity and that, in co-ordination with our European partners, we are prepared to impose additional costs on Russia for its actions" (The Guardian, 2014a). Many other leaders used similar rhetoric and the quickly imposed sanctions did therefor not come as a surprise.

To provide an overview of the imposed sanctions against Russia, the following world map shows which countries have introduced a sanction imposed and which have not, where the green countries are the ones that have imposed sanctions on the blue coloured Russia.[3]

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[3] For a full list of countries with sanctions against Russia, see appendix.

The sanctions included all the standard measures of asset freezes, travel bans and arms embargo along with a restriction of access to Russia's economic and financial markets. The restriction states that for the EU, nationals and companies cannot use financial instruments issued by Russian banks or use services related to such instruments (Council of the European Union, 2014c). Besides just disabling for the direct possibility to act on the Russian financial market, it also limits EU nationals' and companies' presence on the Russian goods market as both trading and acting on the Russian market requires interaction on the financial market. The financial restriction is thus both affecting the direct trade in goods and the trade with intermediate goods used for production in Russia, aggravating the possibility to produce and ultimately export goods abroad. It is also worth mentioning that the sanctions did not go un-responded from Russia and in August 2014 they decided to imposed counter-sanctions and restricted imports on food and agricultural products from the US, the European Union, Australia, Canada and Norway (The Guardian, 2014b). The analysis in the paper regards export and export markets and the counter sanctions will thus not directly affect the estimations, however it is worth mentioning as a further remark on the status of the relations between the parties.

3. Previous Research

Since the late 20th century there has been a significant increase in the interest for studying the impact of economic sanctions from different perspectives. However, despite the rather comprehensive research on the general field of economic sanctions, it is worth mentioning that studies on *trade effects* from economic sanctions is not as widely covered. With this said, literature on the subject do exist and from a perspective of the subjects of this paper, the research and articles can be divided in two levels. One section of research in the general field of trade effects of economic sanctions and one, considerably slimmer, subsection that covers the specific subject of the recent economic sanctions against Russia. Considering the relative scarcity of studies on specific trade effects from sanctions, along with the topicality of the Russia sanctions, this paper will contribute to the research in the field by studying trade effects of the sanctions on Russia, which up until the publication of this paper has not been done before.

Hufbauer, Elliott, Cyrus and Winston (1997) wrote one of the trademark articles on trade effects from economic sanctions, where the authors investigated what impact US sanctions

had on bilateral trade flows. Their findings showed that not only did the trade in the sanctioned sectors reduce, but also trade in sectors that were not directly targeted by sanctions were negatively affected. This implies that the effects on bilateral trade flows go beyond just the prevailing sanctions, twisting the trade pattern for the sanctioned country in a larger scale. Hufbauer *et al.* (1997) also notes that countries that are similar to the sanctioning country but do not have a sanction imposed shows a positive effect on trade flows with the sanctioned country, which is interesting since it touches briefly on the viewpoint and purpose of this paper. Despite the intuitive effect of positive trade flows for outside countries, there are also effects on countries that are not directly targeted but geographically located beside the targeted country. Slavov (2007) finds that neighbours to counties targeted with sanctions by The United Nation (UN) have decreased trade flows during the period of the sanctions. This is argued to be an effect of increased transportation costs and trade disruptions by for example cut of trading routes. Slavov calls these neighbouring countries "innocent bystanders" that are just at the wrong place at the wrong time. In contrast to Hufbauer *et al.* (2007) this shows that there are several effects to consider when analysing changing trade patterns as a cause of imposed sanctions.

On the findings from Hufbauer *et al.* of positive trade flows for countries that are similar to the imposing country, Yang, Askari, Forrer and Zhu (2009) investigate the effect on EU's trade flows with countries targeted by sanctions imposed by the United States. Their results show that in the short run, EU's trade flows with the targeted country are negatively affected by the US sanctions. This is argued to be a consequence of the immediate depressing effect on the sanctioned country and its overall economic activities. However, in the long run they find a positive effect on trade flows with EU and thus, the trade flow pattern has shifted to gain the non-sanctioning countries. The authors call this transfer of trade flows a "third-country effect" and conclude that these effects can also be sanction-busting, implying that the targeted country is not harmed as much as intended by the imposing country.

These articles are important to understand the effects and impacts of economic sanctions in a general perspective, but they do not say anything about the prevailing situation with the sanctions against Russia. Despite this situation being rather recent, Hinz and Crozet (2016) approaches the issue and investigates how the sanctions against Russia have affected the direct trade between Russia and EU. The authors divide the paper in two sections where the first part analyse trade flows and the second analyse prices of traded goods, both estimations

are carried out with a gravity model. The included products are also disaggregated and divided into "Embargoed" and "Non-Embargoed" products to enable analyses in differences between products that are included in the sanctions and those that are not. The results shows that the bilateral trade flows for all traded products have declined from the second wave of the sanctions, the same holds for trade in embargoed products. However, trade flows of non-embargoed products have decrease already from the first wave of sanctions. It is argued that the non-embargoed products account for 83.1% of the lost trade, something that the authors refer to as collateral damage. This collateral damage is suggested to be a consequence of the financial sanctions on Russia, hampering trade finance services needed to operate in the Russian market.

Furthermore, the authors apply a view of discussion on the costs related to imposing sanctions, contrary to the more common angle of estimating the damage from being the target of a sanction. The authors find that the countries that have imposed sanctions on Russia as a consequence of the Ukraine conflict has, from the imposition in 2014 until the end of 2015, lost US$ 44 billion. Shedding light upon the fact that sanctions do not only affect the targeted country in a negative way, their results are implying that there are incentives for countries to carefully investigate whether or not they should impose a sanction.

4. Theoretical Framework

As previously mentioned, sanctions as a policy tool relies on the conception that countries benefit from trading with each other rather than living in an autarky situation producing everything it consumes itself. This section contains the framework to explain why sanctions are imposed in a theoretical approach.

First, in order to provide a simple picture of how countries are affected by not being able to trade, Figure 1 provides a straightforward supply and demand diagram with two scenarios. One that implies that the target would find itself in complete autarky situation and another where it trades freely with the rest of the world. The situation is viewed from the domestic market of the targeted country. The figure will be supporting in understanding the fundament of the analysis regarding how the target's exports is affected if it does not find alternate export markets. The diagram presents a case were the targeted county is a natural exporter of a good,

perfect competition is assumed such that the autarky equilibrium is at the price *p* and quantity *q* and the world price is at *p'*.

Figure 1. Excess Supply
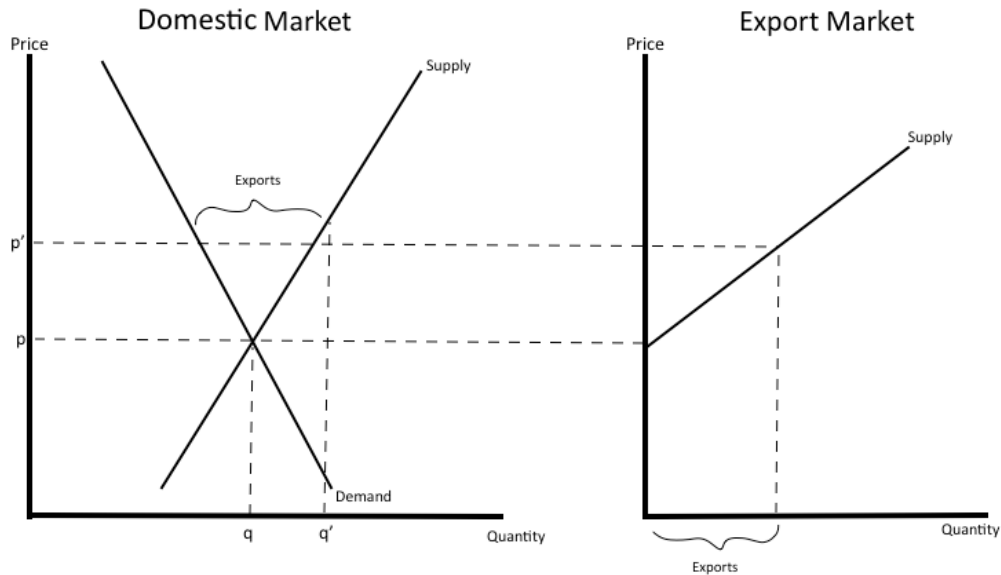
Starting with the case of free trade and no sanctions, the targeted country is producing a total of *q'*. As this output level is higher than the domestic demand, there is an excess supply that the country is then exporting to the rest of the world. This export level is depicted in the export market diagram where all of the domestic excess supply is sold on the world market at the price *p'*. When considering the autarky case where the country has sanctions imposed, the new price level would be the autarky price *p*. At this price level, the supply and demand is equal at output *q*. Looking at the export market diagram, the price *p* does not generate any excess supply and hence there would have been zero exports at this price level even without the sanctions. The effects of the sanctions can be seen as domestic output has decreased by *q'*-*q*, which naturally hurts the targeted country. As discussed earlier, the intention from the imposing country is that the magnitudes of the negative effects are large enough for the targeted country to change its behaviour so that the sanctions are lifted.

Moving on to a more advanced model of how the sanctions affect the target's economy, consider a hypothetical case where there are no trade at all with the countries that imposed sanctions. Also this time there are two scenarios, one before the sanctions are imposed and one when there are sanctions imposed. The effects of going from free trade to the sanction-scenario is visualised in the diagram in Figure 2, where the situation is viewed from the

market of the countries that are imposing sanctions, the ones that are no and the targeted country respectively. This figure will show how the target's exports are affected as well as how the third countries can be benefiting. The diagram presents a case were the targeted county is an exporter of a good, the equilibrium before the sanctions implies that there is a world price p and the targeted country exports a total of X to both *Senders* and *Neutral*.

**Figure 2. Export effects of sanctions**
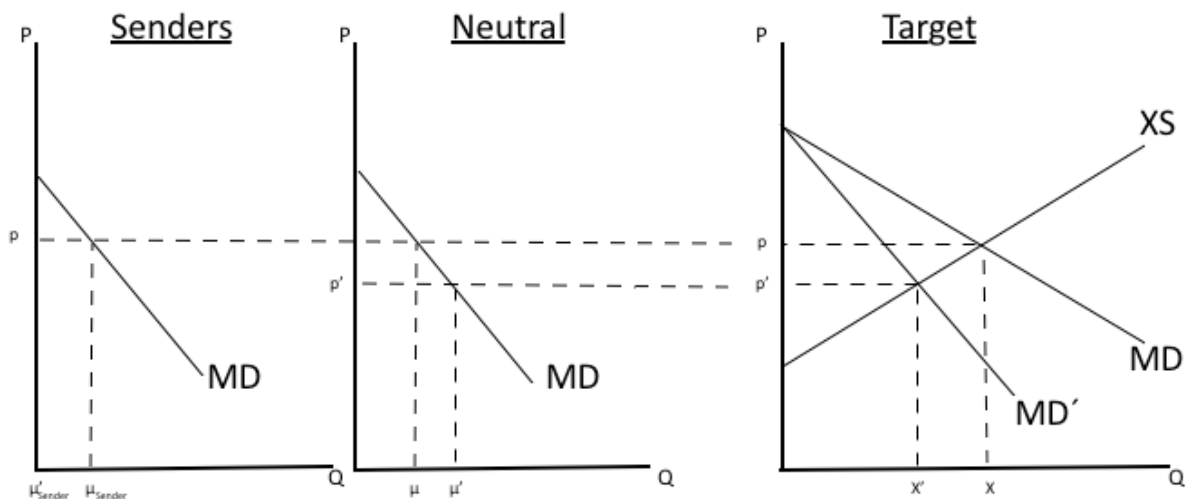
Starting again with the case of free trade and no sanctions, the targeted country is producing a total of X. As no country has yet imposed sanctions, the import demand that the target faces is the aggregated import demand to the whole world. This export supply and aggregated import demand generates the equilibrium level with X exports at the price p. Moving on to the case where *Senders* impose sanctions on the target, this implies that their import demand shift from μ_{Sender} to μ'_{Sender} which is equal to zero. The aggregate import demand curve shifts to *MD'*, generating a new equilibrium where the target's export level is decreased to X' and the new price is p'. The neutral countries now demands μ' at this new price, which is an increase from their previous μ imports. From this, it is easy to see that there are countries that could benefit from not being involved in sanctions that are imposed.

As the previous section discussed the effects from sanctions from the export perspective of the targeted country, it is also possible to look at the situation from the eyes of the sender countries. This time, it is not assumed that the sanctions completely shut of trade, but instead the sanctions are assumed to generate higher costs of trade compared to the countries without

sanctions on them. Note that the cost of trade should not be confused with the price of he products exported, as in the above figure. The diagram, which has its origin from a reversed type of preferential trade theory, is depicted in Figure 3. The increased costs of trading with the sanctioned country is visualised by the difference in T for the sanctioned country and the Rest of the World. T thus represents the trading costs for the importing country. In the normal state with no sanctions, the exporting countries have the same prerequisites as they can export goods at P'-T, generating $X^{T'} = X^{R'}$ exports.

Figure 3. Export effect
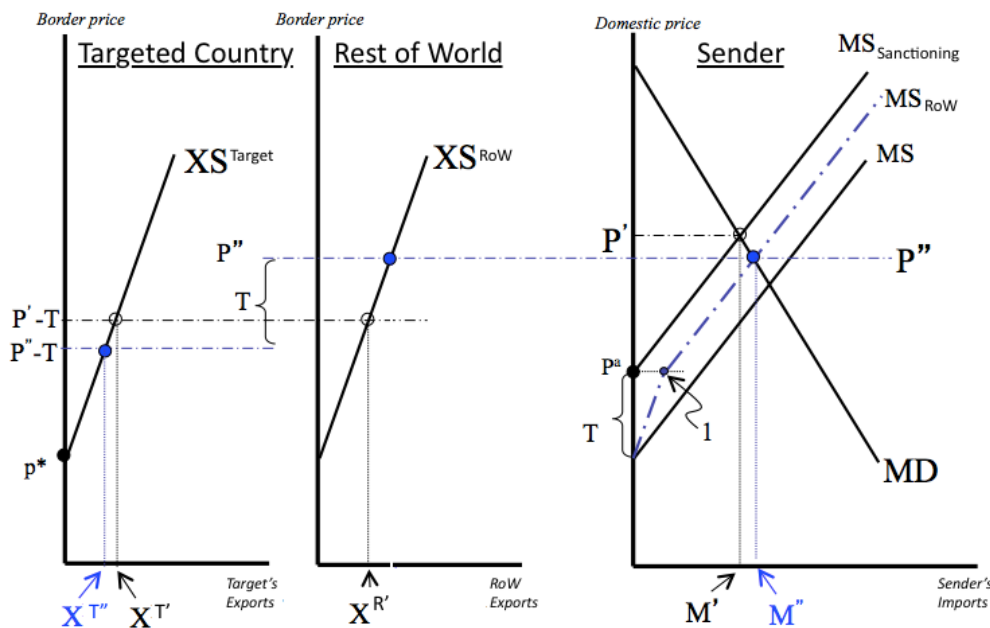
Source: Baldwin and Wyplosz (2012)

When a sanction is imposed, the targeted country instead has higher trading costs, shifting the MS curve to $MS_{Sanctioning}$ which implies that the border price decrease to P''-T while the rest of the world still faces the border price P'-T. The consequence of this is can easily be identified as the targeted country's exports fall to X^{T*}. This decrease in exports is directly related to the first question of research in this paper, as this theory suggests a decrease in Russian exports from having sanctions imposed.

There are also theoretical models on a deeper level that can be used to explain the effects of trade and in this specific case, the effects of not being able to trade. In addition to the overall approach above, the New Trade Theory considers a more detailed view on trade, acknowledging the emergence of trade in intermediate goods in addition to the trade in final

goods. With the connected and globalised world today, a final good is rarely assembled completely from products origin from the same country. Building on the Hecksher-Ohlin theory, input goods that are used in a final good can be traded from the country with a comparative advantage in producing that specific good. Thus, it is not hard to visualise the large trading networks created for the production of advanced products, generating potential chain effects through the imposition of a sanction from both perspective of the imposing and targeted country.

The aspects discussed in this section describe theoretically why a sanction-targeted country's economy is affected by the on-going sanctions imposed on them and also why certain third part countries might benefit from them. The theories also emphasize the importance of finding new export markets in order not to be too severely hurt by the sanctions. It is also worth stressing the fact that shifting trade and export relations should not be considered a simple and straightforward matter, but rather as a potentially complex procedure as old business relations will be ended and new ones have to be established.

5. Method

The objective of this study is to estimate how sanctions affect previously established trade flows and the possibility of creating new ones. It does so by empirically analysing the on-going sanctions against Russia with data on the bilateral trade flows of goods exported from Russia to the rest of the world. In this way it is possible to identify if shifts in the trade pattern in the world has emerged and if so, in which direction. With the essential basics and foundations of the paper accounted for, this section will act as a bridge from the theoretical part into understanding the construction and purpose of the fundamental estimations that are carried out. It is done by providing both an insight to the datasets being used, as well as through a thorough review of the empirical model used. The specific model is described in detail and a discussion on advantages and potential drawbacks are included to render a transparent and clear picture of the performed estimations.

5.1. Empirical Model

When analysing trade flows and the different determinants of trade, the gravity model has been the most commonly used method for a long period. The fundamental idea of the model lays in a conception that bilateral trade flows are larger the higher economic mass there is between the countries, also considering other factors like distance between countries and

population. A more detailed explanation of the variables included in the analysis will be provided later in this section. There are various ways of estimating the gravity model, where new alterations and improvements have emerged regularly during the last centuries. Anderson and van Wincoop (2003) presented what is widely considered as a benchmark paper on how to estimate trade flows with the gravity model.

5.1.1. Export Similarity Index (ESI)

The analysis on trade diversion and the potential shifts in trade flow in this paper is fundamental, considering the objective to examine these very effects of sanction. To be able to find these effects, it is necessary to identify the countries that are likely to be "new" alternate export markets. Previous studies on this kind of topic suggests a method of finding the similarity between countries are in terms of trade characteristics by assessing how much their trade overlap each other. In this way it is possible to identify possible substituting markets by estimating the similarity between the countries that have imposed sanctions and the ones that have not. Using a measure called Export Similarity Index (ESI) identifies these potential benefiters from the sanctions. The index was put forward by Finger and Kreinin (1979) and is still considered the benchmark method for investigating similarity in traded products between countries. To implement the analysis on potential trade effects, the usual gravity model variables are complemented by different variables that address the sanctions on Russia in various ways. There are two straightforward variables on Russia's overall trade effects post sanctions as well as on the countries that have imposed sanctions. A third variable covers potential benefiters of trade flow as they have a similar trade pattern as the countries that have imposed sanctions. This is calculated with the ESI as mentioned in the theoretical section of the paper. ESI, which is also called the Finger-Kreinin Index, was put forward by Finger and Kreinin (1979) as a formula to measure the similarity in products exported or imported between two countries to a third market. More specifically, the idea behind it is to capture the similarity in the fraction of traded product categories and the model is defined as

$$ESI(ij,k) = \left\{ \sum_c Min. \left[\frac{x_{cik}}{x_{ik}}, \frac{x_{cjk}}{x_{jk}} \right] \right\} \qquad (1)$$

Here, ESI is measuring the export similarity between country i and country j in their trade with country k. The products traded are divided in product sectors each with the notation c. Thus, $\frac{x_{cik}}{x_{ik}}$ represents the share of trade in sector c between i and j relative to total trade

between the countries. To provide an intuitive explanation to the measure, if two countries have identical trade pattern to the third country the index will take the value of 1 and if totally dissimilar it will take the value 0. This formula will enable for calculations and credible approximations of which countries will have potential benefiting from the Russian sanctions in terms of increased trade flows. The variable and its interpretation will be discussed more thoroughly along with the other included variables below.

5.1.2. The Gravity Model

When it comes to the estimation of the gravity model, Anderson and van Wincoop (2003) originally used a least squares method to estimate their model, something that later been debated not to be optimal for several reasons. First, the common problem with zero trade flows is generating problems with such a model due to the logarithmic nature. In this case, this is not an essential feature as the zero-trade flows are not included in the sample due to a complication of identifying missing values of reported trade flows and separating them from actual zero-trade flows[4]. Second and more importantly for the estimations carried out in this paper, trade data is commonly suffering from heteroscedasticity, implying that the error term increases with the size of the trade flows which biases and makes the effects inconsistent when estimated in a log-linear form (Yotov, Piermartini, Monteiro and Larch, 2016). These issues can be solved by estimating the gravity model with a Poisson Pseudo Maximum Likelihood (PPML) estimator (Santos Silva and Tenreyro, 2006) which is considered the most accurate estimator. The PPML will thus be the estimator of choice for the model used in this paper and in its most basic version it takes the form of Equation (2).

$$X_{ijt} = \alpha_i + \beta_1 ln(GDP_{it}) + \beta_2 ln(GDP_{jt}) + \beta_3 conflict_{jt} + \delta_c + \lambda_{ij} + \gamma_t + \varepsilon_{cijt} \qquad (2)$$

The above model is thus a standard PPML gravity model and it will be estimated with importer-exporter fixed effect panel data to address possible endogeneity issues. This will control for the unobservable characteristics that do not vary over time and country-pairs such that the included variables capture as much as possible of what they are intended to (Yotov *et. al,* 2016). The main explanatory variable is c*onflict,* which sis a dummy variable that takes the

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[4] It should be noted that doing this can affect the estimations as the actual zero-trade flows are not included in the sample

value 1 for the time period during the Russia-Ukraine conflict and 0 if the time period is not during the conflict. Regarding the indexes in the model, i denote the observation's importing country, j the exporter, t is the year and c represents the product sector traded. γ_t and λ_{ij} represents the time- and country-pair fixed effects while X_{ijt} is the dependent variable and denotes the bilateral import to country i from country j at the year t. δ_c is a variable that controls for differences between product classes, using disaggregated data and controlling for varieties in traded products will decrease the possibility of receiving biased effects due to sector-specific trade characteristics. It should be noted that many of the usual gravity model variables are controlled for without being included in the variable list, due to the fact that Russia is the only exporting country and therefor are constant. This includes variables such as *contiguity, colonial history* and *common language* to some of the more important ones. The gravity model takes the form of Equation (2), it is however not the only model, but rather the basic form of more advanced models that will be used in the estimations. Hence, as this paper aims to carry out an advanced and multi-faced analysis, Equation (2) merely acts as the basic model which examines how Russian exports are affected by the sanctions while more sophisticated models are then built to examine if and how Russia's trade flow might have shifted. The full and final model is Equation (3).

$$X_{ijt} = \alpha_i + \beta_1 ln(GDP_{it}) + \beta_2 ln(GDP_{jt}) + \beta_3 Benefiter_{jt} + \beta_4 Sender_{jt} + \delta_c + \gamma_t + \lambda_{ij} + \varepsilon_{cijt} \qquad (3)$$

The main explanatory variables will be the sanction dummy-variable *Sender* and the variable *Benefiter*. *Sender* has the value 1 if the importing country has imposed a sanction on Russia as a consequence of the Ukraine-conflict. To emphasize previous discussion, these sanctions are not explicitly applied to trade on regular goods, but due to financial sanctions and asset freezing in Russia, a zero-effect is not necessarily expected for this variable. *Benefiter* represents the countries' highest Export Similarity Index for any of the countries that have imposed sanctions on Russia, during the years the on-going sanctions. Considering the regular gravity model variables, the countries' respective size is controlled for with the *GDP* variables on each observation. *ln GDP$_{it}$* contains information on the importer's GDP at time t, while *ln GDP$_{jt}$* contains information on the exporter's GDP at time t. Both GDPs are in log values. Since Russia is the only exporter in this model, this variable will naturally on represent the GDP of Russia. The GDP variable also has another important advantage, as it

controls for the present Russian recession and decreases the risk of an endogeneity problem in the estimation. This implies that this variable captures the effects from a general decline in the Russian economy, so that this effect is not accidently found in the main variables *sender, benefiter* and *conflict.* Furthermore, the European Parliament reported that trade flow effects in different product sectors varies considerably between the EU countries (Szczepański, 2015). In order to control for such differences in trade flows due to differences in products traded, the variable δ_c is included and captures all differences in sector specific trade[5]. This is a useful control variable since it increase the probability of assessing more accurate changes in the trade flows due to the sanctions instead of changes in trade flows due to changes in for example decreased demand in a certain product sector irrespective of the sanctions.

At last, the robustness tests and the estimations methods used to perform these will consist of additional variables in order to investigate the credibility of the main results. These variables and estimation methods are described in that specific section and will hence not be further discussed here. As the main model is estimated with fixed effects Poisson Maximum Likelihood, commonly included bilateral variables of the gravity model that are constant over time is automatically accounted for. Once again, since Russia is the only exporter in the model, some country-pair specific characteristics are also constant over time. For these reasons, variables such as *distance, colonial history, and common language* are controlled for in the model but not written out in the equations.

5.2. Data

There are three different types of data that are being used in this gravity model. The primary source of information when conducting the model is naturally the bilateral trade data, which is collected from the UN Comtrade (2017) database. In order to generate an as sophisticated model as possible, the trade data is disaggregated by the Harmonized System (HS) classification on a 2-digit level, implying that exports and imports are classified through a total of 99 product categories. This enables for creation of the previously discussed control variables by dividing the traded goods into different product sectors according to regular standards (Foreign Trade Online, 2017). The original 99 product classes are thus being distributed into the 15 product sectors used to control for potential differences in trade flows between products in the model. The time period of the sample stretch from 2007-2016, where

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[5] More information on how this variable is constructed is found in *5.2. Data*

the most recent data available is used in order to achieve an as contemporary and up-to-date analysis as possible. As mentioned previously, the dataset does not contain any zero-trade observation, which both has advantages and caveats. The advantage is that there will be no doubt to whether observations with zero trade is a missing, non-reported observation or if there actually were no trade present. The downside is that not all true observations will be included in the sample, which can affect the estimations. However, as the benefits of using only positive, non-zero trade flows overweigh, this is how the dataset is constructed.

The second type of data used in the model is the country-specific data. This is the data that is most characteristic specifically for estimations with gravity model as it contains information on the countries that are trading with each other. The Gross Domestic Product (GDP) of a country acts as a proxy for a country's size and this data is collected from the World Development Index (The World Bank, 2017). Furthermore, country-pair data such as distances between countries are collected from the CEPII Institute (CEPII, 2017). At last, the third type of data used in the estimations is the country specific sanction data that specifies whether or not a country has imposed a sanction on Russia. Also included is information on the nature of countries' attitude towards the prevailing sanctions. The data on imposed sanctions are collected from the EU and UN and the ESI are in 2014 numbers (Azubuike, Mendez-Parra and Rollo, 2014). The robustness section investigates how the definitions of the different variables are affecting the result, where also information on countries' attitude towards the Russian sanctions are incorporated. This information on attitudes is collected from reporting media and newspapers (Russia Direct & Gazeta.ru, 2014). Finally, the different type of dataset are merged and analysed, not only in main the model described above, but also in a number of robustness tests and extended estimations for reasons that will be discussed in the Empirical Results section.

5.2.1. Descriptive Statistics of Data Sample

This section aims to provide both an understanding of which type of data is included in the dataset as well as offering an easy interpreted overview. Furthermore, the sections can act as a fundament to the credibility and topicality of this paper by establishing, or at least arguing for the legitimacy of the dataset.

Figure 2 sums Russia's exports during the time period of the data sample. The figure displays absolute exports for both the countries imposing sanctions (*senders)* and the countries similar to Russia (*benefiters)*. The aspect of interest is the change in exports over the years and for pedagogical reasons the absolute values are not published. Instead, the figure intends to provide an overview of the relative changes in exports over time and despite the relatively short time span, it is still possible to observe both recent macroeconomic events that occurred as well as differences between the two groups of countries. The financial crises in late 2008 has clearly affected exports in the following years and, of course, the effects from the instability in Russia as a result of the Ukraine conflict in 2014 marked by the dashed line. In addition to providing an overview of the activity over the last years, Figure 2 can also be used as an argument for the reliability of the dataset.

**Figure 4. Russian Exports to the Rest of the World**
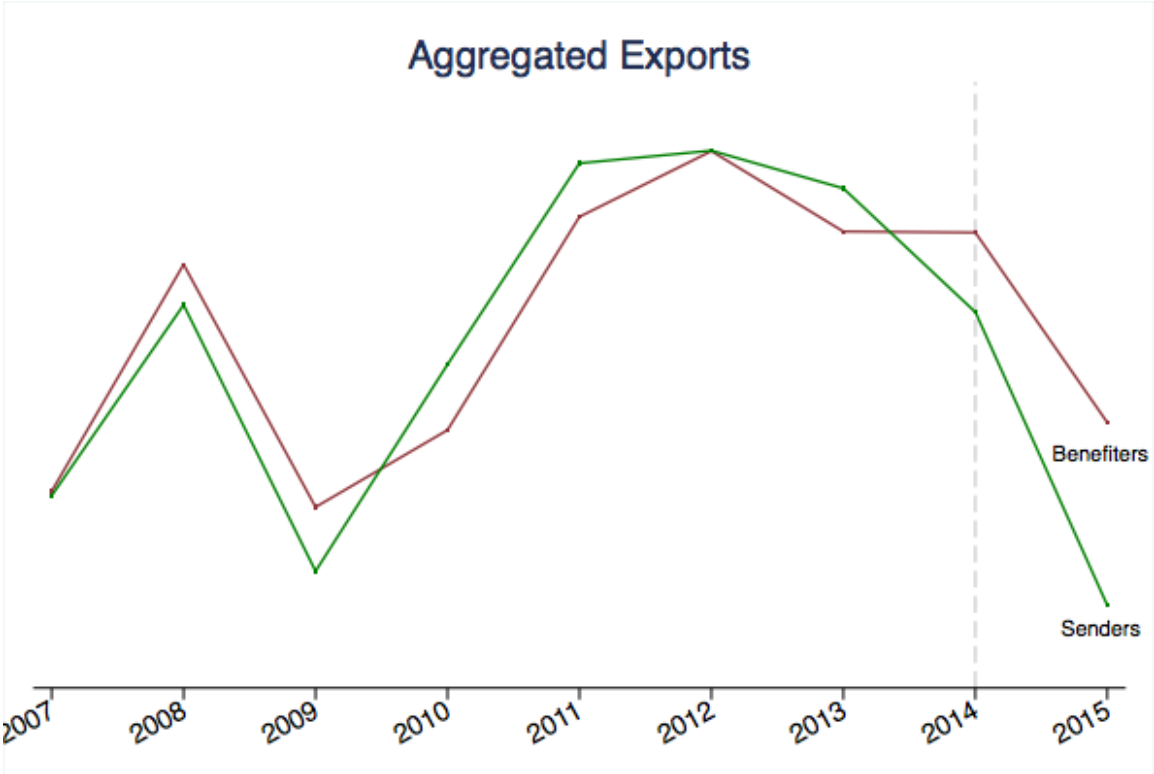
Changing perspective from the previous figure, where the exports from a Russian view were depicted, it can also be mentioned who are the big Russian trade partners in the sample. In line with the fundamental theories of the gravity model, Russia's biggest export markets are also their closest export markets as Europe and Asia contributes to about 90% of total trade. America is the third biggest export market, which despite the distance accounts for

approximately 8% of total exports, something that in a gravity model context can be explained by the relatively large economic size of the continent.

To provide a picture of what type of goods Russia exports, Figure 4 contains Russia's total exports disaggregated on product sector level during the time period of the sample. To little surprise, the product sector "Mineral Products" containing petroleum oil and gas is by far Russia's largest export sector. Chemicals and metals constitute the second and third largest export sector. In the other end of the spectra, leathers, furs, hats and footwear are the sectors with the least exports. This can undoubtedly be argued to conform to the previously discussed economic theories on comparative advantage and abundance, yet again stressing the justice of the data as a good foundation for analyses. The large part of exports in mineral products also signals that awareness needs to be raised when performing the estimations, since this implies that the trade in these products might dominate the results. However, even though one precautionary measure is taken by including the product sector control variable, robustness tests will be carried out with mineral products excluded from the sample.

Figure 5. Disaggregated Export
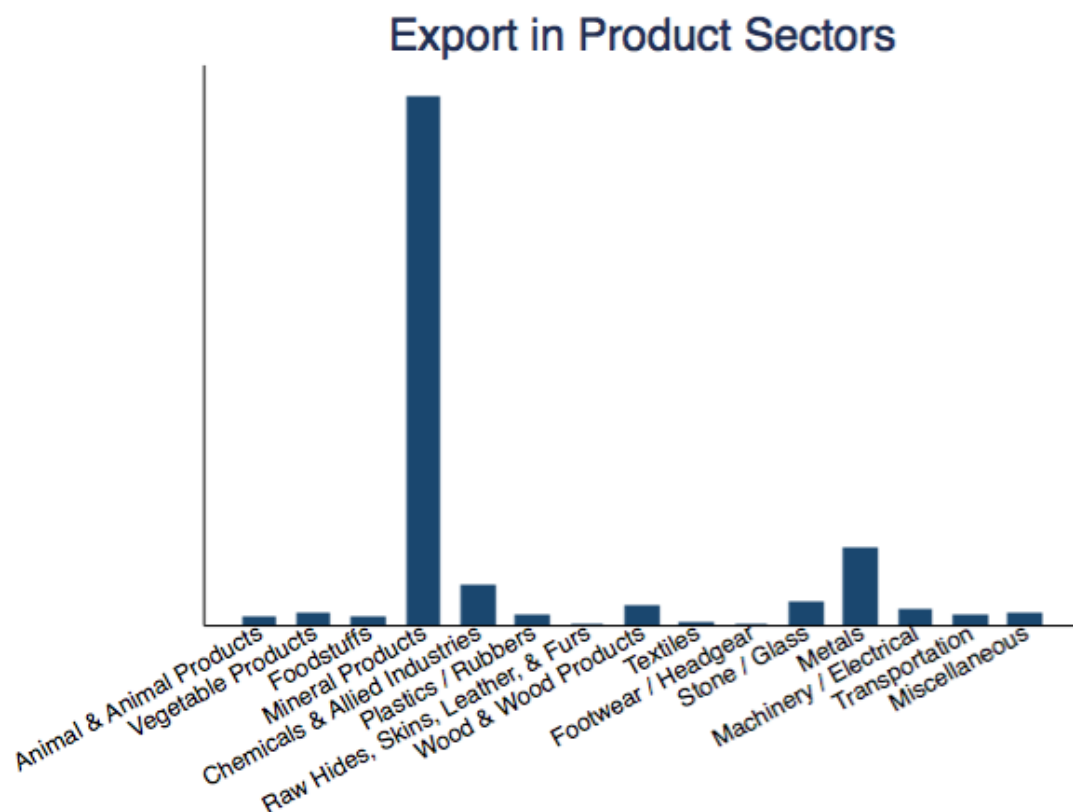
Bearing in mind that conclusions should not be drawn from descriptive statistics, it is still useful as an indicator and a good feature to explain the dataset. However useful it may be as an overview, more important arguments have been emphasized in this section. With a dataset that is shown to be consensual with both present and prevailing economic climate and events, the data also appears credible as the foundation for the empirical estimations. If the dataset had not been in line with the economic events and theories, there would have been reason to question the estimations carried out from it.

6. Empirical Results

This section is the foundation for the analyses and estimations carried out to examine the questions regarding trade flow effects that stems from the sanctions against Russia. First, to emphasize the objective of the paper, the main purposes of the estimations will be reviewed and discussed along with an explanation of applied models and variables. Secondly, the empirical results will be thoroughly examined and analysed accompanied by interpretations of the results. At last, several robustness tests will be carried out as well as a discussion on potential caveats of the estimations. Even though the intention is to generate a model and results that is as accurate as possible, transparency is of great importance and a discussion on possible shortcomings contributes to the overall understanding of the estimation results.

6.1. Estimations

As previously discussed, the estimations of this paper have the intention of examining how the sanctions against Russia have affected its exports. Explicitly, this is achieved by analysing Russian exports to the rest of the world by looking at several key characteristics. The basic model used to perform the estimations is Equation (2) but in order to build up the analysis, estimations on various alterations of this model are also carried out. The dependent variable will always be bilateral exports from Russia to the destination country; in this way the interpretation of the explanatory variables is simply an effect that each specific variable has on Russian exports. However, the specific interpretation for each variable varies depending on the nature of it, and will be discussed individually along with its particular coefficient. The estimation results can be found in Table 1.

Table 1. Estimation Results

Variable	1	2	3	4
ln GDP Dest.	0.42***	0.33**	0.36**	0.40***
ln GDP Rus.	0.85***	0.89***	0.87***	0.86***
Conflict	-0.10**			
Sender		-0.14**	-0.15**	
Benefiter			-0.15	0.18
Time effects	YES	YES	YES	YES
Country-pair effects	YES	YES	YES	YES
Sector effects	YES	YES	YES	YES
N	55069	55069	55069	55069

*Note: Significance levels: * p<0.10; ** p<0.05; *** p<0.01*

The first analysis regards the overall Russian exports to the rest of the world and is found in column 1. The model contains the usual gravity model variables plus the variable *conflict*, which is a dummy variable that has the value 1 for the years when Russia have sanctions imposed on them as a consequence of the Ukraine conflict and 0 otherwise. First, the two variables controlling for size, *ln GDP* of the importer and exporter, both have positive and significant coefficients, which is expected for gravity model estimations. A negative coefficient is expected on the *conflict* variable, as this would imply that the estimation is in line with previous research, indicating that overall Russian exports have reduced since sanctions were imposed. This is also the result as the coefficient has the value –0.10 and is statistically significant on a 5% level, stressing the theory that Russia need to seek alternate export markets and cannot operate in the old markets to the same extent as they did before the Ukraine conflict. Resting on these results, a more sophisticated model is built to examine both if Russia's exports have shifted at all and further also how it have shifted. First, column 2 is an estimation of to what degree the decreased Russian exports can be derived specifically from the countries that have imposed sanctions. The coefficient of interest in this estimation is the one for the *sender*-variable, which has a value of -0.14 and is statistically significant on a 5% level. This suggests that Russia exports less to the countries that have imposed sanctions than to the rest of the world, which ultimately allows for further estimations to examine if

their exports have been diverted. The result is interesting since the sanctions do not explicitly apply to goods exported from Russia (with an exception for firearms and weapons) and yet there appears to be a negative export effect that is present.

The final estimation is then carried in from foundation of these previous findings, examining to what degree Russia are instead exporting to countries similar to the sanctioning countries that they have decreased their exports to. Column 3 has thus included the variable *Benefiter*, for which a positive coefficient imply that Russia have indeed diverted their exports to countries similar to the sanctioning countries. The variable is created with the values from the previously discussed Export Similarity Index. Looking at the estimation results, the coefficient for *benefiter* is not significantly different from zero, implying that it is not possible to state that Russia have increased their exports to these countries. Instead the result suggests that despite the decreased exports to the rest of the world, Russia's exports to the countries similar to the sanctioning countries have not decreased.

Summarising the estimation results, the estimations suggest that there are three main effects on Russia's exports where; *(i)* Russia's overall exports to the rest of the world has decreased, *(ii)* exports to sanctioning countries have decreased more than the rest of the world and *(iii)* exports to countries similar to the sanctioning countries have not decreased.

6.2. Discussion and Robustness of Results

This section acts as a supplementary discussion with the intension of dissecting the main estimation results in order to find plausible flaws or problems that might occur. By performing robustness tests through various methods and angles, the findings in this paper will be discussed so that the estimation results are as transparent as possible. The robustness tests are carried out by estimating Equation (3) with other methods, including new variables and also by changing some variables. This is done to test if there might be any variations or definitions that is driving the main results to an extent that gives reason to question them. The robustness tests are found in Table 2.

Table 2. Robustness Tests

Variable	OLS	GLS FE	Oil excl.	Sim. dummy	Sim. + Crit.
ln GDP Dest.	0.57***	0.57***	0.25	0.33**	0.35**
ln GDP Rus.	0.12	0.12	0.51***	0.89***	0.88***
Sender	-0.05	-0.05	-0.15*	-0.24*	-0.19*
Benefiter	0.68**	0.68***	-0.17		
Sim. Dummy				-0.15	
Sim+ Criticism					-0.09
Time effects	YES	YES	YES	YES	YES
Country-pair effects	YES	YES	YES	YES	YES
Sector effects	YES	YES	YES	YES	YES
N	55070	55070	53158	55069	55069

*Note: Significance levels: * p<0.10; ** p<0.05; *** p<0.01*

As mentioned before, estimating the gravity model by OLS is not the optimal method, it is however useful when performing robustness tests as it can be a good validator to the main results. Therefor, as a first measure of the robustness, the model in Equation (3) will be estimated by Ordinary Least Squares (OLS), where the only alteration to Equation (3) is that the dependent variable is in log values. The coefficient for the *benefiter* variable stands out, as it is positive and significant on a 10% level, which can be interpreted as that exports have increased to the countries similar to the sanctioning countries. This result differs to the main estimation, where no effect was found on these countries, which gives some incentive to at least put a question mark on the original results. However, it does not contradict the main points of the original results where the export to the "similar countries" did not decrease. Again, the OLS estimation is not the optimal method for these estimations, which can be sensed the coefficient to *ln GDP Rus.* is not significantly different from zero. Another estimation of Equation (3) is also carried out, but with a fixed effects GLS method instead of the PPML method. The results are the same as the OLS estimation, which for natural reasons is not surprising, as the two are based on similar methods of estimations.

The following three estimations are all performed with the original PPML method, but with different alterations to the model. This is done in order to examine if the main results are driven by specific definitions of variables or certain products. As depicted in the descriptive statistics section, export of mineral products constituted a large part of Russia's total exports. The estimation in the column *Oil excl.* is therefor carried out on all products except the mineral products, in this way the effects of all other products are presented. The coefficients are similar to the ones in the main estimations, except for the *ln GDP dest.* which is not significantly different from zero here. The result suggests that exports decreased to the sanctioning countries and exports to the "similar countries" did not decrease, much like in the main estimations where all products were included. The conclusion that can be drawn from this is that trade in oil does not drive the main results.

The next test will use a transformed interpretation of the ESI in order to investigate if the results depend on how the ESI-measure is specified. Hence, in the column *Sim. Dummy,* the original variable *benefiter* is transformed into a dummy variable, where all countries that have an ESI above 0.2 are considered similar to the sanctioning countries. These countries therefor have the value 1 and all other countries that are "not similar" have the value 0. Examining the test, the coefficients all have like values and significance as the main estimation, implying that the result is not dependent on how similarity is defined. Finally, the constitution of the *benefiter* variable is narrowed down considerably. In the column *Sim. + Criticism* the original variable of possible benefiters of the sanctions contains countries that satisfy two dummies. Here, countries that have expressed criticism against the sanctions have the value 1 and as in the previous test, countries that are similar to the sanctioning countries have the value 1. These two are merged into the variable *Sim. crit.* which thus have the value 1 if countries are similar and have also expressed criticism against the sanctions. Intuitively, these countries could be happy to trade with Russia as that are opposing the sanctions and have the same trade characteristics as the imposing countries. The results are however in line with the main estimations, not suggesting increased Russian exports to these countries.

The above tests have examined the robustness of the original results in this paper, finding both support for the main estimations as well as potential areas of improvements. Regarding the constitution of the particular variables, the tests did not find that the results where dependent of how variables where defined. Neither did the large fraction of mineral exports drive the result in another direction than suggested by the main estimations. What did have

some impact was the choice of estimation method, as both the OLS and GLS estimations indicated that export to the countries similar to the ones imposing sanctions did increase. However, despite the fact that these methods have been argued to have flaws and are not considered optimal for estimating the gravity model, their results should not be completely neglected. Instead of completely discrediting them, the results can be argued not to contradict the main estimations in the perception that they also suggest that the exports to the similar countries have not decreased.

7. Summary and Conclusion

This paper has examined if trade diversion can decrease a country's negative effects of having sanctions imposed. It is again worth stressing the fact that the main objective of the paper is to examine how countries targeted with sanctions manage to divert trade in a general perspective, but the estimations are carried out on the specific case of the Russian sanctions. Two questions building on each other is raised in order to specify the intension and purpose of research. First, the question on how Russia and its exports were affected by the sanctions against them was examined. Secondly, the paper aimed to investigate how trade to third countries could decrease potential negative effects of the sanctions. This was examined through estimations on Russia's exports to the rest of the world, where in the later estimations, countries were distinguished in line with their individual characteristics needed for the analysis. The analysis was carried out with a gravity model estimated with Poisson Pseudo-Maximum Likelihood on a total sample of 55,070 observations. In addition to the main results from the estimations, several robustness tests were performed in order to assess if there were reason to question the results due to specification problems or other factors driving the results.

The results of the estimations showed that Russia's exports have decreased since the sanctions were imposed. Furthermore, the sanctions had a negative effect on the export to the countries imposing the sanctions, but exports to countries similar to Russia without sanctions imposed did not fall. The conclusion from these results can be threefold, where it could be argued that *(i)* overall exports to the rest of the world decrease when targeted with sanctions, *(ii)* exports to sanctioning countries have decreased more than the rest of the world and *(iii)* exports to countries similar to the sanctioning countries have not decreased. Thus, a country that is

targeted with sanctions need to increase exports to other markets to a high extent in order to minimise the negative effects from the sanctions.

As a finishing remark, this paper has based the estimations on the relatively young, prevailing Russian sanctions and diverting trade could be a slow process. It could therefor be useful to carry out a similar report on the sanctions ex-post to ultimately examine the definitive effects on whether or not the effects of the sanctions could be decreased by successful trade diversion after the conflict is solved and the sanctions are lifted.

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Appendix

List of countries with sanctions imposed on Russia

Members of European Union

Australia

Albania

Iceland

Canada

Lichtenstein

Norway

New Zealand

USA

Ukraine

Montenegro

Switzerland

Japan

Equador

List of countries that are against the sanctions on Russia

Argentina

Belarus

Brazil

Serbia

China

India

Chile

Ecuador

South Africa