The Russian Boycott and its Effects on Dutch Trade Flows

Measuring the effect of the Russian boycott on Dutch agri-food export flows

Erasmus University Rotterdam: Erasmus School of Economics
Isabelle Tiems, 480213
Supervisors: L. Pozzi & C. de Vries
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Abstract

This study investigates how Dutch exports in the agri-food industry have reacted to the Russian sanctions that were installed in August 2014. As Russia appeared to be an important destination for Dutch exports of sanctioned commodities prior to the Ban, it is expected that exports flows were affected. By testing three hypotheses that all address a certain aspect of this issue, this thesis has provided a comprehensive analysis of the exact effects of the Russian Ban on Dutch sanctioned export flows in the agri-food industry. The final conclusion of this thesis is that the Russian Ban indeed has left its mark on Dutch export flows in the agri-food industry. The negative impact was noticeable both on a bilateral level between the Netherlands and the Russian Federation, as well as on a global level between the Netherlands and all 37 countries included in the dataset. Post-Ban, the Netherlands were successful in diverting their trade of sanctioned products to other countries. This thesis has added to the literature on the specific influence of economic sanctions on trade patterns.

1. Introduction.

In early March 2018 the newly formed Pro-Russian government of the Crimean Peninsula requested the Kremlin for the inclusion of the Crimea into the Russian Federation after a strong military and political offence. On March 18th, this request was granted and Vladimir Putin formally completed the annexation of the previously Ukrainian territory of the Crimean Peninsula. This sign of geo-political aggression rippled throughout the international community and was almost unanimously judged by the rest of the world as a serious violation of the Ukrainian national sovereignty (Newsroom - European Commission, 2017).[1] In order to express the disapproval for the Russian role in the region and to persuade Russia to let the Crimea remain part of Ukraine, the Western World issued retaliatory measures upon Russia. As a part of these measures, the G8 banned Russia as a member and the United States (U.S.), the European Union (E.U.), Japan, Canada and others imposed joint trade restrictions upon Russia.[2] On the 7th of August 2014, the Kremlin responded by issuing presidential decree no. 778.[3] This decree restricted agri-food imports, such as fruits, vegetables, dairy products and most meat products originating from those countries with economic sanctions against the Russian Federation (Russian Federation, 2014). To this day, the Russian counter-sanctions are still in effect.[4] As the Netherlands were the second biggest agri-food exporter of the world and a significant share of its exports went to Russia, one can imagine the severe impact the Russian sanctions had on the Dutch agri-food industry (Deutsch, 2014, van der Vliet, 2015).

Since the start of the 20th century, economic sanctions are commonly applied in international conflicts. They typically come into sight when other diplomatic pressure falls short but military intervention is yet one bridge too far (Davis and Engerman, 2003). Because of their flexibility, they form a comprehensive diplomatic tool that aims at isolating the target country (target),[5] or specific persons, from the surrounding world (United Nations Security Council, 2013).[6] According to Barber (1979) the rationale behind sanctions stems from the assumed connection between economic activity and political behavior. It is a causal chain in which economic punishments leads to economic dysfunction, civil uproar and political disintegration which ultimately forces the government to comply to the criteria of the imposing country. However, previous research has cast some serious doubt on both this causality and the effectiveness of sanctions. For starters, Caruso (2003) points out that in the light of increasingly intergraded global economies, sanctions may have a negative impact on the imposing country (sender) as well, as they create a suboptimal allocation of goods.[7] Besides this, it could very well

[1] North Korea for example did not support this judgement.
[2] EEAS, 2014. Sanctions Policy.
[3] Appendix 10.1 provides an unofficial English translation of this decree.
[4] The Ban runs until 31 December 2018.
[5] In this thesis, 'Sender' and 'Target' will indicate the country that imposes the sanctions and the country that receives the sanction respectively.
[6] *Chapter 2.1.* will elaborate on the structure of sanctions and their flexible character.
[7] When 'sanctions' is written, this paper refers to 'economic sanctions', if not explicitly mentioned otherwise. 'Sanctions' and 'economic sanctions' will be used interchangeably.

be that the Target circumvents the sanctions by simply taking its business elsewhere, hereby diverting its trade. Only if the entire world jointly enacts, the Target could be truly isolated. Furthermore, sanctions appear to be most effective shortly after installment. As time passes by, the Target adjusts and takes measures in order to counter the negative aspects of the sanctions.[8] The recent events have stressed the importance of research into the direct and indirect effects of sanctions on trade patterns.

1.1 Problem Statement & Research Questions

As the Russian Federation was an important export market for the Netherlands, the Russian import ban has made an impact on the Dutch economy.[9] In 2013, the year before Ban was installed, total Dutch export to Russia valued near €7 billion, making Russia the eleventh biggest importer of Dutch products. Around €1.5 billion were agri-food exports of which €527 million were linked to sanctioned products. In 2014, over 5000 jobs in the Dutch agri-food industry were attributable to Russian export business (Deutsch, 2014).[10] After the sanctions were imposed, the agri-food sector experienced a decrease in export value of more than €0,5 billion, when comparing 2015 to 2013 (CBS, 2015).

This paper aims at analyzing the impact of the Ban on Dutch trade flows in the agri-food industry. Where there is extensive economic literature about the success of economic sanctions to change a sanctioned country's behavior, less literature is available about the specific effects on trade flows after sanctions are installed. This thesis will extend the latter field of research by investigating the effect of the Ban on Dutch agri-food export flows.

The investigation will focus on three main hypotheses each addressing a different aspect.

After the Russian Government installed the Ban, the export value of sanctioned products to Russia was expected to decrease, causing trade destruction. This theory is tested with the following hypothesis:

Hypothesis 1: The Russian Ban decreased the value of Dutch sanctioned export flows to Russia.

Hypothesis 2 extends hypothesis 1 by assessing whether the negative effect of the Russian ban was also reflected by a decrease of the global export value of sanctioned products:

Hypothesis 2: The Russian Ban decreased the global value of sanctioned export flows.

In order to counter the negative effect of the Russian Ban, Dutch exporters could try to increase trade with other countries than Russia. This theory is tested with the following hypothesis:

[8] The target may for example be to reallocate resources from sanctioned to non-sanctioned industries.
[9] From now on, this study refers to the Russian import ban as the Ban.
[10] Agri-food is defined as: food products and living animals. From now on, this study uses the terms commodities in the agri-food industry and agri-industrial commodities interchangeably.

Hypothesis 3: The value of sanctioned export flows to other countries than Russia increased in the post-Ban period.

1.2 Relevance of Research & Structure of Paper

Broad research is available on the effectiveness of economic sanctions in altering the Target's behavior. However, quantitative research regarding the (in)direct effects of sanctions on the Target's trade patterns, is less extensive. By empirically addressing the main questions of this thesis, it contributes to the existing literature on trade dynamics, trade destruction and trade diversion. Although previous research has investigated the impact of the Russian sanctions on regional trade flows (such as the EU),[11] the effects at the country-specific level of the Netherlands have not been thoroughly investigated. Even though one can intuitively consider the consequences of a boycott, it is important to quantify the exact effects in order to develop adequate policy adjustments capable of countering negative effects.

The impact of the Ban on the value of Dutch agri-food exports between January 2010 and December 2017 will be assessed within the framework of the gravity model of trade. Because not all agri-food products are affected by the Ban, 3-digit disaggregated data is used in order to distinguish sanctioned from non-sanctioned products within the same industry. The use of this data in combination with monthly intervals, makes it possible to obtain a detailed picture of the impact of the Ban on the different Dutch agri-food industries.

This paper is constructed as follows. The next chapter describes the political background of the Crimea-territory and addresses the current situation. Chapter 3 draws the economic framework in which sanctions are assumed to have an effect. Chapter 4 provides an overview of the most significant literature concerning this topic. Chapter 5 addresses hypothesis 1 and investigates the impact of the Ban on Dutch export flows to Russia. Chapter 6 assesses the impact of the Ban on a global scale and focusses on hypotheses 2 and 3. Chapter 7 provides some robustness checks along with important limitations of this research. Finally, chapter 8 sums up the main findings of this thesis.

2. Political Background

"The strongest of all warriors are these two: Time and Patience"
– Tolstoy in War and Peace (1869)[12]

In order to fully grasp the complexity of this political conflict, it is important to get some understanding of the historical background that Russia and the Crimean Peninsula share.

[11] When 'trade flows' is written, this paper refers to 'trade flows in the agri-food industry', unless explicitly written otherwise.
[12] The famous writer Leo Tolstoy (1828-1910), who was the author of among others *War and Peace* and *Ana Karenina*, fought in the Crimean War in 1853 and later published a number of short stories about his experiences in the battlefields.

2.1 **Historical-Political Background**

Since the early modern history,[13] the Crimean Peninsula has been the home of three major ethnic groups: Russians, Ukrainians and the Crimean-Tartars (Keys, 2011).[14] In 1783, Catherine the Great (1762-1796) was the first Russian ruler to claim the peninsula, recognizing the strategic position of the ports where the Russian Black Sea fleet could be stationed. This caused a significant part of the Crimean Tartar population, who were mainly Muslim while Russia was officially Catholic, to resettle in the Ottoman Empire. When the Crimean War broke out in 1853, the peninsula became the scene of Russian military defeat in the battle between the Russian Empire on one side, and France, Britain and the Ottoman Empire on the other. Even though the battle was lost, the Crimea remained part of the Russian Empire (Magocsi, 2014). After the Bolshevik Revolution, the Crimea was considered part of the Russian Soviet Federation Socialist Republic since 1921. In the aftermath of the WO II, Stalin started to deport the entire Crimean Tatar population, accusing them of collaboration with the Nazi army. The Tartars were dumped into working camps in Uzbekistan or elsewhere in the Soviet Union. Over 40.000 Crimean Tartars died in this period, while Russians were settling on the land that used to be Tartar territory (Keys, 2011). This continued until Stalin died in 1953. After a political struggle for power within the Soviet Union, the Crimea was given to Ukraine in 1954 (Kramer, 2014). During the liberalization of the Soviet Union in the late 1980's, Ukrainian nationalism was in the upcoming. Since then, the exiled Crimean Tatars have been returning to their home land (Magocsi, 2014).

After the collapse of the Soviet Union, The Crimea became an autonomous part of the republic of Ukraine. However, due to the strong historical and cultural ties, the large ethnic Russian population always had a pro-Russian sentiment. When Yanukovych won the presidential elections in 2010, he promised to renew the economic and political ties that Ukraine and Russia shared.[15] But when he accepted a $15 billion loan from Russia in late 2013, he sparked the 2014 Ukrainian Revolution as thousands gathered at the Independence Square in Kiev to protest against his government (Yuhas, 2014). During the next couple of months, the Ukrainian Revolution grew more violent, ultimately leading to the election of a new government and the ousting to Russia of Yanukovych in February 2014. Taking advantage of the chaos, Vladimir Putin authorized military intervention in the Crimea in order to seize strategic sites and government buildings. Unmarked Russian troops were send and ordered to occupy and stabilize Crimean land (Yuhas, 2014). All this culminated into the annexation of the Crimean Peninsula on the 18th of March 2014. The Russian claim of the peninsula fueled heavy resistance among Western governments, who considered the intervention an illegitimate act with a clear expansionistic goal.

[13] The Early Modern started in the 16th century and includes historical events as the Protestant Reformation and the European Renaissance.
[14] Many other ethnic groups have populated the Crimea before this time. Among them: the Ottoman Turks, Monols. Greeks, Scytho-Samartians.
[15] Yanukovych even announced that the Russian language would be the second state language of Ukraine (Iakist, 2011, p. 27).

2.2 Current situation

In the days after the annexation, Western governments such as the U.S., Canada, Switzerland, Australia and Japan amongst many others joined the E.U. in imposing economic and political sanctions upon the Russian Federation which were officially enacted on September 8th, 2014 (EU Official Journal 2014). The aim of the sanctions was to affect the Russian economy in multiple areas as they were a combination of asset freezing, financial exclusion, an import Ban of Russian arms and a Ban on the imports of energy related services. In august 2014, The Russian Federation reacted by imposing counter-sanctions, focused on restricting imports of agri-foods such as dairy products, fish, fruits, meat and vegetables. The Russian Decree describes the sanctioned products in a Combined Nomenclature (CN) 4 digit-commodity code level.[16] In *appendix 10.1*, an unofficial translation of Decree no. 788 is given, along with a list of the sanctioned products described in the corresponding CN 4 digit-commodity codes.

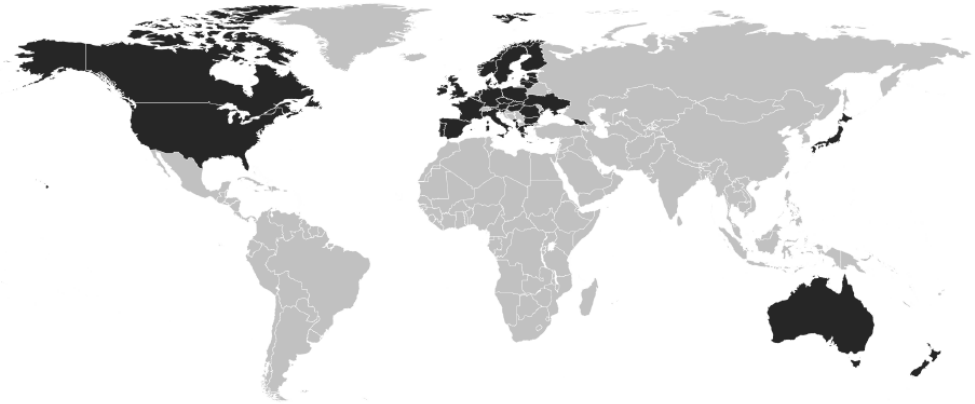

Figure 1 - 2016 map of countries imposing sanctions against Russia and being subject to counter-sanctions
Source: CEPII working paper (2016)

Figure 1 gives an overview of countries that imposed sanctions against Russia and were exposed to counter-sanctions in 2016. Countries indicated by the black color, fall into this category.

3. Economic Sanctions

"The most irrelevant question one can ask about economic sanctions is:
Do they work?" – deKieffer, 1983

Economic sanctions are not phenomena of the modern time; one of their first descriptions dates all the way back to 432 BC, when the city of Athens installed a trade embargo on Megara which ultimately accumulated into the Peloponnesian War (Eaton and Engers, 1999). Since the beginning of the 20th century, they have become more frequent. This chapter elaborates on the

[16] The Combined Nomenclature (CN) is a tool that allows goods to be classified in a certain way. This tool is frequently used in both intra and external-EU trade statistics.

structure and the economic theory of sanctions and introduces the concepts of trade destruction and trade diversion.

3.1 Structure of Sanctions

Sanctions are viewed as political instruments that can be installed to preserve or restore international peace without the use of military forces (Davis and Engerman, 2003). They can be triggered by numerous economic or political causes in order to serve as proactive, punitive or demonstrative measures. Sanctions can be applied unilaterally, when one single country decides to sanction a Target,[17] or multilaterally, when a group of countries (or a multilateral organization such as the U.N. or the E.U.) jointly decide to install sanctions.[18] In the literature, there is no consensus on which kind of sanction is considered superior, as different studies provide different results (a.o. Drezner, 2000). Intuitively, multilateral sanctions have a larger impact since they are broader implemented and are thus more effective in isolating the Target from the rest of the world. However, this is not always the case. As Bapat and Morgan (2009) point out, unilateral sanctions can be constructed as to target the exact areas the imposing country wishes to affect. In the case of multilateral sanctions, it can be challenging to construct an effective sanction since the will of all participating countries needs to be taken into account. Because of political arbitrage, sanctions may fail to be a comprehensive solution and research on the effectiveness of multilateral sanctions versus unilateral sanctions is ambiguous.

Caruso (2003) distinguishes three different kinds of economic sanctions:[19] (i) embargoes (ii) boycotts and (iii) financial sanctions. The first two categories are trade flow restrictions and prohibit trade going from one country to the other country (or set of countries). Where a boycott bans partial or total imports from one or a set of countries, an embargo works in the opposite direction and prohibits partial or total exports to one or a set of countries. Financial sanctions affect lending and investing possibilities in the target country, prohibiting partial or total capital flows to the Target or freezing its foreign assets. Nowadays, policymakers usually combine multiple economic sanctions in order to affect the economy of the Target in a broader sense. Furthermore, political sanctions such as travel-restrictions for certain persons are also frequently combined with economic sanctions. These so called 'smart sanctions' can be adjusted to specifically affect areas where the greatest impact can be made, while limiting the collateral humanitarian costs that sanctions can cause (Lopez, 2007).

[17] In the past, the U.S. have imposed several unilateral sanctions upon countries, such as Cuba, Iran and North-Korea. The sanctions were deemed justified because these countries developed policies that were threatening, or are still threatening, U.S. public and security interests (Kern, 2009).
[18] Since the emergence of organization such as the U.N., E.U. and W.T.O., multilateral sanctions have become more frequent. 1963, the U.N. imposed its first sanction upon South Africa, targeting the apartheid regime. Since then, the U.N. installed economic sanctions in 15 other cases against Iraq, the former Yugoslavia, Libya, Haiti, Somalia, and Liberia, the UNITA faction in Angola, Rwanda and Sierra Leone among others.
[19] Besides economic sanctions, countries may also apply diplomatic sanctions such as travel Bans. Since this thesis investigates economic sanctions, only this type of sanction will be discussed.

3.2 Economic Theory

The economic motivation behind sanctions is based upon several assumptions of international trade theories, which expect free trade to maximize global economic welfare because of reasons of efficiency and productivity. According to the Heckscher-Ohlin model, countries have different factor endowments. Because specific goods need specific proportions of production factors, countries may have a comparative advantage in the manufacture of certain goods. Consequently, the country will produce goods that require its abundant factors intensively, utilizing production surpluses for exports while importing goods that require the scarce factors intensively. In a free-trade world, this country is better off than it would be in an autarky. Trade sanctions as embargoes or boycotts impose exogenous shocks to the Target, forcing it into a suboptimal autarky state, while the rest of the world continues to be economically integrated. The Sender can severely affect overall welfare of the Target by deteriorating its terms of trade and reducing national income, forcing compliance of the Target in order to get the sanctions lifted. In order to gain a visual understanding of the previous model, a graphical interpretation is introduced below (Porter, 1979):

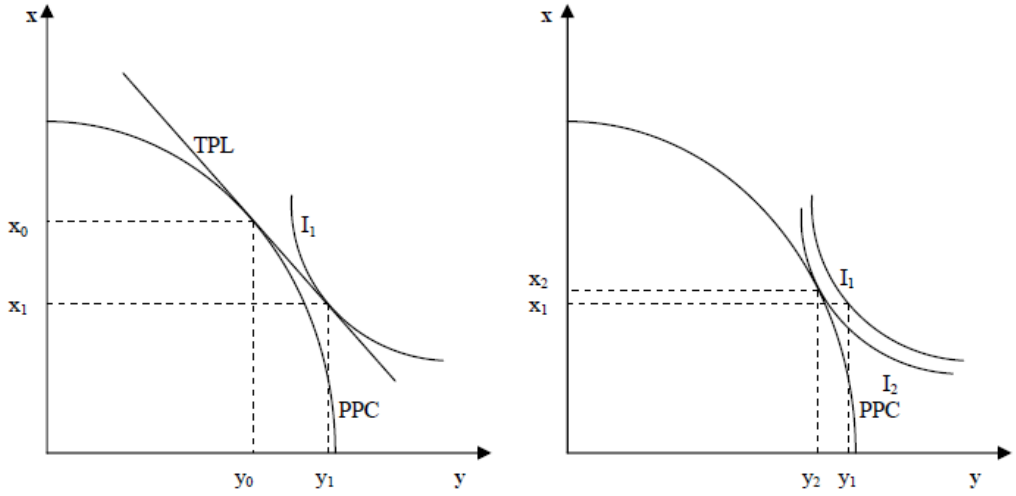

Figure 2: Effect of Trade Restrictions (Porter, 1979)

These figures represent a two-country-model in a static and neo-classical setting. This world produces two goods: *x* and *y*. The left panel represents the initial free trade world in which country T, has the possibility to trade *x* and *y* with country S. T has a concave production possibility curve (PPC), a convex indifference curve (I_1) and an optimizing trade possibility curve (TPL). As can be derived from the left panel, the TPL is tangent to both the PPC and I_1. The optimal production point is described by point (x_0,y_0). The consumption point is described by point (x_1,y_1). This implies that country T will be an exporter of *x* (exports are obtained by subtracting x_1 from x_0) while *y* is imported (imports are obtained by subtracting y_0 from y_1). In the right panel, country S has restricted the possibilities of country T to trade as the TPL curve is removed from the figure. The optimal has become the point in which curve I_2 is tangent to the PPC. This is described

by point (x_2,y_2). This point clearly leads to a lower welfare than the initial point of (x_1,y_1). Therefore, country T faces welfare losses and is hurt by the sanctions.

One has to bear in mind that economic models in general are just crude approximations of reality. This model is no exception to that rule since it entails far-going assumptions regarding the universality of sanctions and the number of available trade partners.[20] In reality, the world is much more complex. In an increasingly globalizing world, countries have developed a state of mutual dependency towards each other. Sanctions are very likely to inflict costs on both the Target as the Sender. The more countries are economically integrated, the more the Sender will potentially suffer from the sanctions and the harder it will be to maintain sanctions in place. Besides this, sanctions can be simply circumvented by intensifying trade with existing partners and exploring trade with new partners.

3.3 **Gravity Equation**

Since its introduction by Tinbergen in 1962, the gravity model has become an important feature in international trade economics. The model relates bilateral trade between two countries to their economic sizes and distances. According to the model, countries close to each other will trade more than countries far apart. Furthermore, countries that have bigger economic sizes (measured in GDP per year), tend to develop more bilateral trade. An analogy between the theory of Tinbergen and Isaac Newton's Gravitational Theory can be drawn because of the important function of the elements 'size' and 'distance' in both theories. In his book *The Law of Universal Gravition,* Newton shows the importance of size and distance (proximity) in determining the attraction of planets. The basic gravity model of trade is described by the following equation:[21]

$$X_{ij} = \mathrm{C}\frac{Y_i Y_j}{t_{ij}} \qquad (1)$$

In this equation, X_{ij} represents bilateral trade between country *i* and *j*. As a proxy for economic size, Y_i and Y_j represent the GDP's of country *i* and *j* respectively. Originally, t_{ij} represented the distance in kilometers between the capitals of the respective two countries. Intuitively, when distance is large, trade costs increase. In recent research t_{ij}, can represent a number of variables influencing bilateral trade costs. These variables can be geographical factors such as a country being landlocked or being an island, and socio-economic factors such as two countries having a common language, religion or colonial past. In 1979, Anderson presented a theoretical foundation for the gravity model by assuming product differentiation by region of origin and constant elasticity of substitution preferences (CES preferences). In subsequent research, the model has become more sophisticated through additions like monopolistic competition

[20] In the considered graphical interpretation, the world only consists out of two countries which implies that the sanctions are imposed universally. This is a very strong simplification of the real world.
[21] In following sections, the dynamic version of this model will be presented. However, in this section the static model is presented in order to introduce the economic theory in an understandable form.

(Bergstrand, 1990) and firm heterogeneity (Helpman, Melitz and Rubinstein, 2008), although these models have kept the CES-preference structure.

As can be deducted from equation (1), bilateral trade increases in Y_i and Y_j, and decreases in t_{ij}. However, according to Anderson and van Wincoop (2003), an important variable is excluded from this equation. As Anderson (2010) points out: "*Each sale has multiple possible destinations and each purchase has multiple possible origins: any bilateral sale interacts with all others and involves all other bilateral frictions."* Basically, this means that sales from *i* to *j* are not only influenced by bilateral trade frictions between country *i* and *j*, but with all bilateral frictions that *i* and *j* incur with all their possible trade partners. In order to solve this general equilibrium problem, Anderson and van Wincoop (2003) presented a structural gravity model in which they introduce the multilateral resistance term (MRT). In their model, they represent the gravity model as follows:

$$X_{ij} = \frac{Y_i Y_j}{Y_W}\left(\frac{t_{ij}}{\Pi_i P_j}\right)^{1-\sigma} \tag{2}$$

in which Y_W represents world output, σ is the elasticity of substitution parameter and is assumed to be larger than 1 (in order to obtain $(1-\sigma) < 0$).[22] Besides this, the following holds:

$$\Pi_i = \left(\sum_i \left(\frac{t_{ij}}{P_j}\right)^{1-\sigma} \theta_j\right)^{\frac{1}{1-\sigma}} \tag{3}$$

$$P_j = \left(\sum_j \left(\frac{t_{ji}}{\Pi_i}\right)^{1-\sigma} \theta_i\right)^{\frac{1}{1-\sigma}} \text{ [23]} \tag{4}$$

in which Π_i and P_j are the multilateral resistance terms of exporting country *i* and importing country *j*,[24] and θ_j is defined as country *j*'s output to county *i,* relative to the total output of all other exporting countries to country *i*. Π_i represents the ease of importing country *j*'s market access, which is referred to as the outward MRT. P_j represents the ease of exporting country *i*'s market access and is referred to as the inward MRT. Bilateral trade costs between *i* and *j* are related to the trade costs between *i* and *j* with all their potential trade partners.

Anderson (2010) claims that the gravity model in its structural form can also be applied to disaggregated trade flows. In fact, because trade frictions are often imposed on specific product characteristics, the model will even become more accurate. Equation (2) can therefore be extended into the following form:

$$x_{ij}{}^k = \frac{y_i{}^k y_j{}^k}{y_W{}^k}\left(\frac{t_{ij}{}^k}{\Pi_i{}^k P_j{}^k}\right)^{1-\sigma} \tag{5}$$

in which y_i^k and y_j^k represent country *i*'s sector k's output and country *j*'s sector k's expenditure respectively and where k represents a certain class of goods.[25]

[22] By construction, an increase in bilateral trade costs reflects negatively on bilateral trade flows.
[23] The notation of equation (3) and (4) is obtained from Anderson & Wincoop (2003) and from Behar & Nelson (2012).
[24] Note that t_{ij} and t_{ji} are also included in equations (3) and (4). Therefore, t_{ij} and t_{ji} also indirectly affect X_{ij} through the outward and inward MRT's.
[25] The multilateral resistance terms will also be extended with superscript *k*.

3.4 Gravity Equation & Trade Restrictions

Taking the previous into account, one may ask herself: how do economic sanctions enter the gravity equation and influence trade flows? The answer is: through relative prices. Economic sanctions such as boycotts or embargoes can be considered as (extreme) ad valorem entry or exit tariffs. These tariffs affect bilateral trade costs in equation (2) through t_{ij}. A simplified formula for t_{ij} looks as follows:

$$t_{ij} = r_{ij} d_{ij} \tag{6}$$

in which d_{ij} describes the bilateral distance between two countries and r_{ij} represents the tariff rate (1 + tariff percentage).[26] Substituting equation (6) into equation (2) gives:

$$X_{ij} = \frac{Y_i Y_j}{Y_W} \left(\frac{r_{ij} d_{ij}}{\Pi_i P_j} \right)^{1-\sigma} \tag{7}$$

Equation (7) reveals that sanctions influence bilateral trade costs *relative to trade costs to the rest of the world*. When trade between *i* and *j* decreases due to the effect of r_{ij}, this is trade destruction. When trade with other countries increases due to the increase in the MTR, this is called trade diversion.

This chapter has elaborated on the theoretical framework of this thesis. The next chapter will provide an overview of the existing literature on the success and economic effects of sanctions.

4. Literature Review

> *"For some queer and deplorable reason, most human beings are more impressed by words than by figures, to great disadvantage of mankind"- Tinbergen (1973)*

Empirical research regarding economic sanctions can be roughly divided into two groups. The first group aims at reviewing the success of sanctions in changing the Target's government behavior. The second group analyses the impact of economic sanctions on trade flows. While there is extensive empirical research on the effectiveness of sanctions, research into the specific economic effects of sanctions on trade flows is limited.

4.1 Research into the success of sanctions

Even though some empirical research praises the success of economic sanctions (a.o. Levy, 1990),[27] most scholars have a rather pessimistic opinion regarding the success of economic sanctions.[28] According to Smeets (2018) the track record of economic sanctions is poor, while Pape (1997) is unsure about their capability of solving international disputes.[29] In 1990, Hufbauer et all. provided an exhaustive analysis of 170 cases since WO I in which economic sanctions

[26] For the sake of simplicity, just bilateral distance is mentioned here. However, d_{ij} naturally also includes other relevant factors that influence bilateral trade costs such as common language or common boarder.
[27] Levy (1990) investigated the economic sanctions against the apartheid regime in South Africa. Even though he proved that sanctions had an impact in South Africa, he claimed that this was limited.
[28] Among Others: Hufbauer et all (2007), Smeets (2018), Bergeijk & Marrewijk (1998), Pape (1997).
[29] In his research, Pape (1997) claimed that economic sanctions had an economic success rate of just 5%.

were applied. They concluded that sanctions were effective in only one out of three times. In 2007, Hufbauer, Schott, Elliot and Oegg (2007) revised Hufbauer et all. (1990) and concluded that only in 40 of 174 cases sanctions reached their intended objectives, which implies that less than 1 to four sanctions were successful. This specific rate of success is supported by recent research of the Targeted Sanctions Consortium.[30]

In the light of the previous, one may ask herself: 'Why are sanctions imposed?' First of all, in some cases simply the threat of a sanction is enough to persuade a country to change its behavior (Ang and Peksen, 2007). As these cases are not taken into the treatment sample, there appears to be a risk of selections bias in empirical research. Besides this, sanctions do not always have a practical purpose; sometimes they just have an expressive or demonstrative character (Lindsay, 1986). These sanctions do not intend to bring about any particular changes, but merely desire to express (dis)approval for foreign policy activities. Submitting these sanctions to a success-analysis overlooks the fact that these sanctions never anticipated success. Besides this, the success of sanctions greatly depends on the alternative diplomatic measures that are taken, as sanctions are rarely applied alone. Empirical research has developed some conditions under which sanctions appear to have a greater change at success: i) sanctions are most effective when they are unexpected, as the Target has no time to prepare itself by reallocating production factors to unsanctioned sectors or exploring new consumption markets, ii) by the same logic, sanctions are most effective in the initial years of implementation because the Target has not had enough time to adjust (Van Bergeijk, 2015),[31] iii) lastly, sanctions are more effective when the Target depends more on the Sender than vice versa.

4.2 Analyzing the Effects of Economic Sanctions upon Trade

In order to analyze to which extend Iran was able to divert its trade after the U.S., E.U. and other political partners installed sanctions in the period 2008-2011, Haidar (2013) applied a difference-in-difference methodology upon micro-economic data. A distinction was made between two types of export destinations: a group of treated destinations (countries that sanctioned Iran) and non-treated destinations (countries that did not sanction Iran), in which the latter served as a control group. Haidar (2013) showed that even though exports to sanctioning countries were reduced by a third, aggregate exports did not decrease. Iran was able to divert its trade to other (politically neutral) countries, hereby countering the negative effect of the economic sanctions.

Evenett (2002) conducts a gravity analysis in order to assess the impact that sanctions had on South African exports during the Apartheid-regime. In his paper he distinguishes four periods in which the sanctions vary in their severity and analyses export developments throughout the sample period to eight sanctioning trade partners. Each sanctioning country is

[30] In analyzing sanctions imposed by the U.N., they claimed that less than one out of four was successful.
[31] About 40 % of sanctions succeed in altering target country's behaviour in the first year, whereas about 60 % of sanctions fail to alter target country's behaviour after the fourth year (Dizaji & Bergeijk, 2013).

matched to a similar non-sanctioning country in order to compare the treated and control-group. He finds that exports to the U.S. declined by almost one third, while exports to Japan or Nordic countries did not reveal any statistically significant effect.

Caruso (2003) estimates an augmented gravity model in order to analyze the effect of sanctions on U.S. trade flow to different destinations. More specifically, Caruso (2003) assesses how U.S. trade flow to various destinations is affected by sanctions imposed by the U.S. By introducing multiple dummies for different sanctions in the regression, the unique effect of each sanction is estimated.

Jung (2016) applies the basic gravity equation to a dynamic panel in order to investigate trade flows between North Korea and China. The fact that trade between these countries has increased, implies that North Korea was able to divert trade in order to mitigate the impact of the multilateral imposed sanctions of South Korea and Japan.

This chapter has discussed relevant literature. Now that both the theoretical framework and literature have been reviewed, the empirical part of this thesis will follow. In the following chapters, hypotheses 1, 2 and 3 are tested.

5. Bilateral Impact of the Ban

"The Russian people adore the sweet taste of the Dutch conference pear"
- Koppe & Verink (Volkskrant 17/11/2018)

As indicated in Chapter 1 the effect of the Russian Ban on Dutch export flows will be assessed by investigating three relevant hypotheses:

Hypothesis 1: The Ban decreased the value of Dutch sanctioned export flows to Russia.

Hypothesis 2: The Ban decreased the global value of Dutch sanctioned export flows.

Hypothesis 3: The value of sanctioned export flows to other countries than Russia increased in the post-Ban period.

Important to note that in case hypothesis 1 proves to be false and instead Dutch farmers had kept successfully exporting sanctioned products to Russia, it would not be likely for the Ban to have an impact on global post-Ban sanctioned export flows and hence there would be no reason to investigate hypothesis 2 and 3.

This chapter tests hypothesis 1 while chapter 6 will investigate hypotheses 2 and 3. This chapter contains three parts; the first part elaborates on the difference in difference (DID) method used to test hypothesis 1; the second part elaborates on the panel dataset that is constructed; the third part addresses hypothesis 1 with descriptive statistics in which the trade destructive impact of the Ban can be observed already; the last part empirically addresses hypothesis 1 and quantifies the impact of the Ban.

5.1 Difference-in-Difference Analysis

In 1854, Snow was the first who used a before-versus-after approach when he investigated the relation between a particular water-pump in Broad street, London, and the raging cholera epidemic.[32] Since then, the use of difference-in-difference (DID) analyses has become widespread in empirical economics when the causal effect of a certain policy intervention is estimated (Lechner, 2011).[33] The setup of a DID analysis is intuitive and involves two groups in two periods in which the first group (treatment group) is exposed to treatment in the second period, whereas the second group (control group) is not exposed to treatment in either period. By comparing the outcomes of treatment groups and control group, both in the pre- and post-treatment period, the causal effect of the treatment can be isolated. [34] Central to this analysis is the so called parallel trend assumption which states that prior to treatment the difference between the treatment and control group over time is constant. If this does not hold, the DID estimator is likely to (over)underestimate the causal effect of treatment. Note that this assumption does not require the levels of the groups to be identical prior to treatment.[35]

5.2 Construction of Panel Dataset

The constructed panel dataset uses monthly values of exported agri-food commodities from the Netherlands to Russia in the period January 2012 to December 2017. This time window was chosen to exclude the strong economic turbulence that occurred during the Financial Crisis[36] and to allow for sufficient comparable time both before and after the Ban. The export values are expressed in millions of euros and the commodities are disaggregated to a 3-digit Standard International Trade Classification (STIC).[37] This data was retrieved from the Dutch Central bureau of Statistics (CBS). The panel dataset has dimensions in time (t), which is observed in monthly units, in export flow category (c), which is either sanctioned or non-sanctioned, country of origin (NL) and country of destination (j), which will be the Netherlands and the Russian Federation, respectively, in all observations.[38]

$Export_{ct}$ will serve as depended variable and represents the export value in millions of euros of either sanctioned or non-sanctioned agri-food commodities from the Netherlands to the

[32] In 1849, London experienced one of the worst cholera epidemics in its history, claiming more than 14.000 souls. Snow suspected that cholera was spread by contaminated water. Water supply to inhabitants of London was handled by two companies, Lambeth Waterworks Co. and Southwark & Vauxhall Water Co. who each supplied a specific part of the city. When Lambeth Waterworks Co. replaced its water intake more upstream the Thames, where the water was considered to be "cleaner", Snow investigated whether consumers of Lambeth Waterwork Co. were less likely to become infected.

[33] The DID approach is also frequently used in social sciences or health economics.

[34] One can think about the control group as a reference to what would have happened to the treatment group if treatment had not occurred.

[35] The DID estimator already takes pre-treatment differences in *levels* into account as any variation in levels is differenced out in the ultimate estimator. Systematically, this can be presented as: $(\gamma_1 Nonsanctioned_{before} - \gamma_1 Nonsanctioned_{after}) - (\gamma_2 Sanctioned_{before} - \gamma_2 Sanctioned_{after})$

[36] Even though the crisis was officially declared to be over in 2011, the Financial Crisis is assumed to still have some sort of recovery effect in the years after 2011. As economies were recovering globally, the world economy was expanding. The presence of the recovery effect is acknowledged and will be captured by including yearly time dummies into the empirical estimation.

[37] The Standard International Trade Classification (SITC) is a universal classification scheme, made by the United Nations in order to improve international trade statistics. See the *appendix 10.1* for a list of the sanctioned products and the CN codes.

[38] Because the country of origin and destination will be the Netherlands and the Russian Federation, respectively, in all observations, the subscripts of these dimensions are hidden in order to improve the reader's comfort.

Russian Federation in month t.[39] In the constructed panel dataset, all exported commodities were divided into a sanctioned or non-sanctioned export flow. This process was conducted in two steps: 1 - all disaggregated commodities were categorized either as sanctioned (s) or non-sanctioned (ns); 2 - the disaggregated commodities were aggregated into two groups: a sanctioned and non-sanctioned export flow. These constructed groups will serve as the treatment and control group, respectively.[40]

Table 1 lists all variables included in the constructed panel dataset. $PostBan_t$ is a dummy variable that takes the value of 1 after August 2014, the month the Ban was installed, and 0 otherwise. The dummy variable $Treatment_c$ takes the value of 1 if a commodity is categorized as sanctioned, and 0 otherwise. Besides this, time dummies for the years 2012-2017 were constructed and, finally, the interaction term $Treatment_c$*$PostBan_t$ functions as the DID variable. The coefficient of this term measures the difference in the value of the sanctioned export flow compared to the value of the non-sanctioned export flow, before versus after the Ban.

TABLE 1: VARIABLES HYPOTHESIS 1

VARIABLES	DESCRIPTION	UNITS
$Export_{ct}$	Value of (non)sanctioned commodities, exported from the Netherlands to the Russian Federation	Monthly figures in millions of euros
$Post\_Ban_t$	Dummy variable taking value 1 after August 2014	Dummy (1/0)
$Treatment_c$	Dummy variable taking value 1 if commodity is sanctioned	Dummy (1/0)
DID	Interaction variable ($Post\ Ban_t$*$Treatment_c$)	Dummy (1/0)
D2012-D02017	Time Dummies	Dummy (1/0)
Number of Observations	144	
Number of Categories	2	

5.2.1 Construction of treatment and control group

This chapter assesses the effect of the Ban by comparing the performance of the sanctioned (treatment group) and non-sanctioned (control group) export flows both before and after the installment of the Ban. The two export flows were formed by 1) categorizing the disaggregated commodities as either sanctioned or non-sanctioned and 2) subsequently aggregating them into a sanctioned and non-sanctioned data stream. For this process, the Russian Decree was closely followed.[41] However, during this process, the following data discrepancy was detected. As the Russian Decree describes sanctioned products in a disaggregated CN4-class while the data retrieved from the CBS reports commodities in 3-digit SITC classes, it was not possible to

[39] Note that the subscripts for reporter and destination are hidden. $Export_{ct}$ has to be read as: $Export_{NLRUSct}$. However, to improve the readers' comfort, the subscripts $_{NL}$ and $_{RUS}$ are repressed.
[40] The following paragraph elaborates on the process of categorization.
[41] See *appendix 10.1* for an unofficial translation of Russian Decree no. 778 and a list of the CN4-classess of the sanctioned products.

completely distinguish all sanctioned from non-sanctioned commodities. Since not all CN4-class products could be separately identified in the Dutch export data, some products had to be included in the 3-digit super-class.[42] For example, while the Ban covers vegetables, edible roots and tubers, it excludes sugar maize. As sugar maize does not form a separate class in the SITC-data, sugar maize is included into the group of sanctioned commodities. If the export value of sugar maize would remain unchanged in the post-Ban period, consequentially the export value of sanctioned products would not entirely convert to zero. Due to these convergence issues, the data stream of sanctioned commodities is somewhat polluted with non-sanctioned commodities. This explains why the export value of sanctioned products does not completely convert to zero in the post-Ban period, as will be shown in the following paragraph.

5.3 **Descriptive Statistics**

5.3.1 Graphical Interpretations

In order to acquire a better understanding of the constructed dataset, this section explores the data with some descriptive statistics in which the effect of the Ban can already be observed. Figure 3 shows the export value of sanctioned and non-sanctioned commodities from the Netherlands to Russia. The red vertical line marks August 2014, the moment the Ban was installed. Prominent is the difference in magnitude between the export value of sanctioned and non-sanctioned commodities, as the monthly export of sanctioned commodities accounted for more than 60 million euros in early 2014, while non-sanctioned commodities generated around 10 million euros in the same period. This underpins the relevance of the Russian market for Dutch exporters of sanctioned commodities. Striking in the figure is the strong decrease of the sanctioned export value immediately after the Ban, while the non-sanctioned export value remained more or less unchanged. Since the value of sanctioned export flow experienced a heavy fall, while the value of non-sanctioned export flow did not, this figure supports the hypothesis that the Ban has harmed the Dutch-Russian export flow of sanctioned commodities. As it was prohibited to export sanctioned commodities to Russia, it is expected that the value of these exports dropped to zero post-Ban. Note that, even though the value decreased significantly, the value of the sanctioned export flow did not entirely convert to zero. This puzzling result can be explained by the earlier introduced conversion issues that were experienced during the transformation of the CN4-class data to 3-digit SITC data. Due to the fact that not all sanctioned products were separately identifiable, the data stream of sanctioned products is somewhat polluted with non-sanctioned commodities.

[42] For example, the data retrieved from the CBS does not make a distinction between milk, cream and butter products with or without lactose. The Russian decree makes this distinction and excludes the lactose-free dairy products from the Ban. Due to these kind of convergence problems, sanctioned and non-sanctioned product scan not be completely divided. Therefore, the data streams are somewhat polluted.

In order to investigate the impact of the Ban on a sectoral level, export flows were divided into 4 sectors: bovine, dairy, fish and vegetable-fruit.[43] Figures 4 and 5 show the export value of sanctioned commodities to Russia on a sectoral level. Figure 4 displays the export value of sanctioned bovine and dairy commodities. In this figure, the decrease that occurred after the Ban is evident as the export value in these sectors almost drops to zero. Figure 5 displays the export value of sanctioned fish and vegetable-fruit products. Unlike in figure 4, the Ban does not mark a clear distinction in the trade patterns of these sectors. For sanctioned fish products, this can be explained by the fact that the initial trade was already very low. Hence, the Ban did not have much trade to impact. As for the vegetable-fruit sector, even though the average export value decreased slightly, it did not convert to zero. This can be explained by the fact that the data-related converging problems were most prominent here.[44]

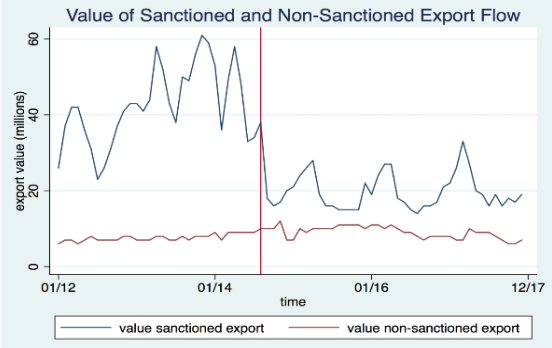

Figure 3: Value of Dutch Sanctioned and Non-Sanctioned Export Flows to Russia

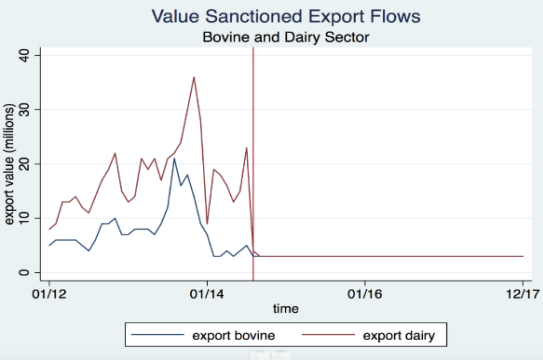

Figure 4: Value of Dutch Sanctioned Export Flow to Russia
Bovine and Dairy Sector

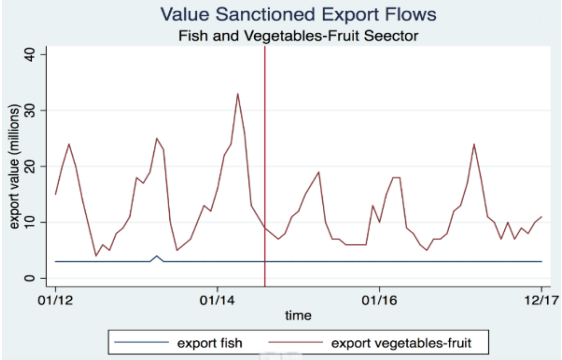

Figure 5: Value of Dutch Sanctioned Export Flow to Russia
Fish and Vegetable-Fruit Sector

5.3.2 Parallel trend assumption

The dependency on a parallel trend for applying the DID approach has already been discussed. As sanctioned and non-sanctioned export flows contain comparable products, it is predicted that their behavior prior to the Ban was similar. Figure 6 supports this, as it displays the development

[43] See *appendix 10.2* for the construction of these sectors.
[44] See also *chapter 5.2.1.*

of the value of sanctioned and non-sanctioned export flows in logarithms.[45] The figure shows that sanctioned and non-sanctioned export flows followed comparable up- and downward movements prior to the Ban. For example, the strong increase in early 2013 and the strong decrease in early 2014 is visible in both series. Post-Ban, however, the series start to show strong differences. Immediately after the Ban, sanctioned export flow experiences a strong decrease, whereas non-sanctioned export flow does not seem to undergo any specific changes. From this point onwards, the development of the series clearly diverges. This indicates that the development of the sanctioned (treatment group) and non-sanctioned (control group) export flows follow a parallel trend prior to the Ban, but not post-Ban. Therefore, parallel trend assumption holds and the undertaken DID approach is appropriate.

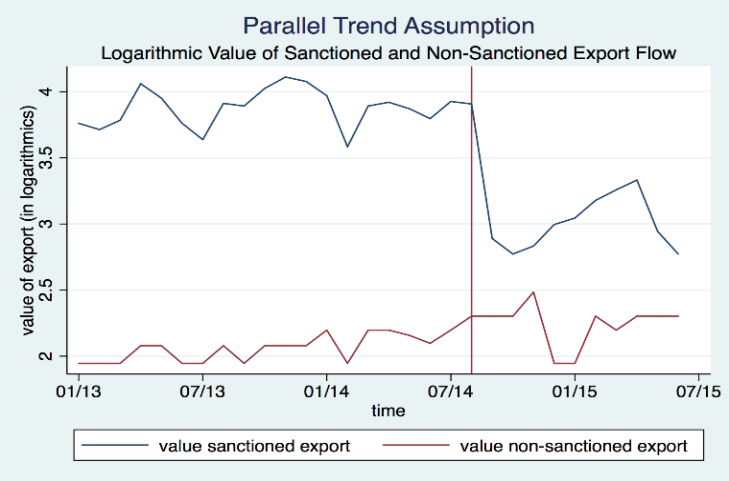

Figure 6: Logarithmic value of Export Flows
Parallel Trend Assumption

5.3.3 Concluding remarks descriptive statistics

Figures 3-5 illustrate the effect of the Ban on Dutch-Russian trade. Figure 3 illustrates how the export value of sanctioned commodities decreased dramatically after the Ban, while the value of non-sanctioned commodities remained more or less unchanged. Figures 4 and 5 show that on a disaggregated level, the impact of the Ban may vary. While the effect of the Ban is unmistakably clear in the bovine and dairy sector, the Ban has made no impact on the fish sector. For the vegetable-fruit sector, the impact of the Ban is not completely clear due to the earlier introduced convergence issues. Even though the effect of the Ban is more prominent in some sectors than in others, based on these figures, the impact of the Ban on Dutch export flows to Russia can still be established. The next paragraph will conduct the DID analysis and quantify the impact of the Ban on Dutch sanctioned export flow to Russia.

[45] Due to the difference in magnitude of the sanctioned and non-sanctioned export flows, these data streams are hard to compare. By investigating these streams in their logarithmic forms, it becomes easier to observe small changes in the trade patterns and hereby verify if the series followed a parallel trend prior to the Ban.

5.4 **Empirical Estimation**

In order to quantify the effect of the Russian Ban on the value of the sanctioned export flow, the following regression is estimated:

$$Export_{ct} = \beta_1 + \beta_2 Treatment_c * PostBan_t + \beta_3 Treatment_c + \beta_4 PostBan_t + \beta_5 D2013 + \beta_6 D2014 + \beta_7 D2015 + \beta_8 D2016 + \beta_9 D2017 + \varepsilon_{ct} \quad (8)$$

in which $Export_{ct}$ represents the value of the sanctioned and non-sanctioned export flows in millions of euros in month t and β_1 is a constant that captures the baseline average. $PostBan_t$ and $Treatment_c$ are included in order to correctly specify equation (8) and represent dummies that take the value of 1 in the post-Ban period and if the export flow is categorized as sanctioned, respectively. Furthermore, a set of time dummies is included in order to capture any existing time trends. The year 2012 is excluded from the regression in order not to fall in any dummy trap.[46] In equation (8), β_2 will be the parameter of interest as this coefficient measures the difference in export value of non-sanctioned products before versus after the Ban was installed minus the difference in export value of sanctioned products before versus after the installment of the Ban.[47] As it was (and still is) prohibited to export sanctioned products to Russia, it is expected that the value of sanctioned export flow decreased in the post-Ban period, relative to the value of non-sanctioned export flow. Therefore, it is hypothesized that β_2 has a negative sign. β_3 measures the differences between the groups prior to the Ban and is expected to be positive as the export value of sanctioned commodities was considerably higher prior to treatment, compared to the export value of non-sanctioned commodities. β_4 captures the time trend of the control group. As the effect of the Ban on the control group is not defined, the expected sign of β_4 is unknown.

5.4.1 Interpretation of significance and regression coefficients

Table 1 shows the results of the estimation of equation (8). This regression is estimated with robust errors. The result of the interaction term is striking because of its strong statistical and economical significance. As the coefficient is statistical significant to a 1% level,[48] it can be interpreted. Relative to the value of the non-sanctioned export flow, the value of the sanctioned export flow decreased with 23.24 million euro per month. The negative coefficient of the interaction term is consistent with prior expectations. Turning to the coefficient of $Treatment_c$, the significant and positive result indicates that prior to the Ban the export flow of sanctioned commodities was on average 33.91 million euro higher. This is consistent with theory and with the descriptive statistics of paragraph 5.3. Besides this, the insignificant result of the $PostBan_t$ dummy indicates that the Ban did not influence the value of non-sanctioned export flow in a meaningful way. Finally, turning to the time dummy variables, one can see that dummies D2013-

[46] As dummy variables express an effect relative to something else, the regression always has to exclude one category of dummies.
[47] Remember that this can be systematically notated as: $\beta_2 = (\gamma_1 Nonsanctioned_{before} - \gamma_1 Nonsanctioned_{after}) - (\gamma_2 Sanctioned_{before} - \gamma_2 Sanctioned_{after})$
[48] In this thesis, coefficients with a statistical significance of 5% or less are viewed sufficiently significant to be economically interpreted.

D2014 have significant and positive coefficients, indicating that the total export value in these years increased relative to 2012. However, in 2015-2017, the time dummies lose their statistical significance at the 5% level. This can be attributed to the fact that the exported volume of agri-food commodities has fallen back to its 2012-level.

TABLE 2: ESTIMATION OF EQUATION 8

DEPENDEND VARIABLE:	$Export_{ct}$
$Treatment_c$*$PostBan_j$	-23.24***
	(1.823)
$Treatment_c$	33.91***
	(1.342)
$PostBan_j$	-0.399
	(2.727)
D2013	7.625***
	(1.574)
D2014	4.014**
	(1.700)
D2015	5.014*
	(3.013)
D2016	4.556
	(3.013)
D2017	4.722
	(3.013)
Constant	3.920***
	(1.299)
Observations	144
R-squared	0.659
Number of Categories	2

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.4.2 Concluding remarks

This chapter has addressed hypothesis 1 and investigated whether the value of Dutch sanctioned export flow to Russia has decreased due to the Ban. The conducted DID analysis quantified the decrease of the value of sanctioned export flow, compared to the value of non-sanctioned export flow, at a monthly amount of 23.24 million euro. As this result appeared to be both statistically and economically significant, it provides supportive evidence on the trade destructive influence of the Ban on sanctioned export flow to Russia and thus on the validity of hypothesis 1. While this chapter has addressed the bilateral impact of the Ban, the next chapter, addresses the impact on a global scale.

6. Global Impact of the Ban

"People ask for sanction against (…) Russia as long as the pump price for gasoline does not jump" – Souche (2014)

Now that the trade destructive impact of the Ban on sanctioned export flows from the Netherlands to the Russian Federation is confirmed, this chapter will address the global impact of the Ban by testing hypotheses 2 and 3. This chapter contains five sections. As hypothesis 2 and 3 are tested within the gravity framework, section 1 discusses some important issues that arise when the

gravity model is applied to actual trade data. Section 2 elaborates on the panel dataset that is constructed in order to test hypothesis 2 and 3, section 3 explores the data with some descriptive statistics, section 4 addresses hypothesis 2 and finally section 5 addresses hypothesis 3.

6.1 The Gravity Framework

Many scholars (a.o. Caruso, 2003) have praised the gravity equation for its reliable predictions of trade patterns. However, several practical issues arise when applying the gravity equation to actual trade data. First of all: in practice it is difficult to obtain the multilateral resistance terms (MRT) since they include both observable and unobservable trade frictions. As a solution, scholars have developed the remoteness index (among others: Head, 2010) that serves to proxy the MRT.[49] This index relates the average weighted distance of country *i* to its share in world GDP. However, the use of this index has been challenged by Anderson and van Wincoop (2003), who claimed that using the remoteness index results into biased estimators.[50] In order to overcome these issues, Feenstra et all. (2004) suggest estimating the gravity equation with importer and exporter fixed effects. Olivero and Yotov (2012) show that including fixed effects provides results that are similar as to when the MRT's were included. One typical disadvantage of using fixed effects is that time unvarying aspects are removed from the equation. Therefore, fixed effects are not appropriate when the variable of interest is time invariant.[51]

A second practical issue is related to the gravity equation in its logarithmic form: [52]

$$\ln(X_{ij}) = \ln(Y_i) + \ln(Y_j) - \ln(Y_W) + \psi \ln(t_{ij}) - \psi^{-1}\ln(\Pi_i) - \psi^{-1}\ln(P_j)$$ [53]

Though easier to work with, the log-linearization of the equation introduces some important shortcomings of the model. As these shortcomings are familiar to scholars, literature provides various solutions on how to deal with them. The first shortcoming is related to a central characteristic of the trade data: the existence of zero-observations in the trade data matrix. As not all countries trade with each other all the time, zero observations are likely to be frequent and tend to increase when dealing with disaggregated data (Anderson, 2010).[54] This introduces the following mathematical issue: as the logarithm of zero cannot be defined, the log-linear form of the gravity equation predicts only positive trade flows. When estimating an ordinary least square (OLS) regression, common solutions to this problem in the literature are censoring or truncation, in which the former involves substituting all zero's in the data matrix by a small positive value (for instance: 1) and the latter implies dropping all zero valued trade flows from the dataset

[49] The remoteness index is described as follows: $REM_i = \sum_j \frac{D_{ij}}{\frac{Y_j}{Y_W}}$.

[50] Anderson and van Wincoop (2003) show that the gravity equation estimated with the remoteness index provides significantly different results than an estimation with the multilateral resistance term.

[51] Since the variable of interest in this thesis is not time unvarying, this is not an issue.

[52] In empirical research, the gravity equation is often transposed into its logarithmic form in order to make it easier to work with.

[53] in which $\psi = (1 - \sigma)$.

[54] In the Newtonian gravity theory, of which the gravity equation of trade is a deduction, gravitational force was allowed to become very small, but never decreased to zero force. However, in bilateral trade patterns, zero observations in the trade matrix are quite frequent.

(Kareem, 2013).[55] A second shortcoming of the transformed gravity equation is the violation of the assumption of homoscedastic error terms (Tenreyro, 2007), which in this context implies that the error term, relative to GDP_j, is not constant across all destinations *j*. Fortunately, Gomez-Herrra (2012) has showed that including fixed effects into the log-linearized gravity model produces homoscedastic error terms. Lastly, Silva & Tenreyro (2006) argue that, according to the Jensen inequality, the transposed gravity equation produces estimates of $\log(X_{ij})$ but not of X_{ij}.[56] In the presence of heteroskedastic data, as trade data often is, this could lead to biased and inconsistent estimates. As a solution to all the shortcomings, Silva & Tenreyro (2006) suggest applying a non-linear estimation to the trade data by using the Poison Pseudo Maximum Likelihood (PPML) technique. This technique does not involve converting the gravity equation into its logarithmic form and it deals with heteroscedasticity that is often present in trade data. This technique will be performed in chapter 7.1 where it will serve as a robustness check.

As censoring is most common among scholars (Kareem, 2013), this method is initially followed and all zero's in the trade matrix are substituted by the small value of 1. On top of that, fixed effects are introduced in order to deal with the violation of homoscedastic error terms.

6.2 Construction of the Panel Dataset

In order to test hypotheses 2 and 3, a second panel dataset is constructed. This balanced panel dataset contains monthly export values of Dutch sanctioned[57] commodities to 59 destinations over the period January 2012 to December 2017. The data retrieved from the CBS expresses the export value in millions of euros and disaggregates the exported sanctioned commodities to a 3-digit STIC. The panel dataset contains the following three dimensions: (i) reporter, (j) destination and (t) time. The Netherlands will be the reporter for all 2612 observations and destination will change with the destination of the sanctioned export flows.

The dependent variable, $\text{Ln}(\text{Export}_{jt})$, represents the logarithm of the total value of sanctioned export flow in millions of euros to destination j in month t. Consistent with the censoring method, all zero observations of Export_{jt} are substituted by the value of 1. After this process, no zero-observations are present in the panel dataset.[58] Besides this, $\text{Ln}(\text{Export}_{jt})$ is divided into four sectors: bovine, dairy, fish and vegetable-fruit as hypothesis 2 is estimated in four alternative specifications in which each different agri-food sector serves as dependent variable.

In the gravity framework, GDP-values are used in order to proxy for economic size. Unfortunately, monthly GDP-values are not available for most countries. Since quarterly values

[55] Although these practical solutions solve the problem of zero valued trade flows in the dataset, the manipulation of the data can lead to loss of information and distorted estimates.

[56] When transforming the gravity equation in its logarithmic form, estimates of $E\ln(\varepsilon_{jt})$ are generated and not of $ln\,E(\varepsilon_{jt})$, and $E\ln(\varepsilon_{jt}) \neq ln\,E(\varepsilon_{jt})$ which results into the so-called Jensen's inequality. As ε_{ijt} suffers from heteroscedasticity, it is not equal to $\ln(\varepsilon_{it})$. Therefore, OLS estimations would lead into biased and inefficient results.

[57] The classification of sanctioned and non-sanctioned commodities is based on Russian Decree no. 778. This decree was closely followed.

[58] Since this is quite an interruptive measure, as one can imagine, *chapter 7.1.* takes another approach in solving this mathematical issue.

could be obtained from the DataStream database, these values were interpolated into monthly figures.[59] The quarterly GDP figures are seasonally adjusted and presented in current prices. As the DataStream database did not provide quarterly GDP-values for all countries of the original dataset, some countries had to be dropped, reducing the final dataset to contain 37 countries.[60]

Table 3 displays all variables included in the constructed panel dataset. GDP_{jt} and GDP_{NLt} represent the GDP of destination j and of the Netherlands, respectively, in month t in millions of euros. In order to comply to the gravity framework, these values are transposed into their logarithmic form. $PostBan_t$ is a dummy variable that takes the value of 1 after August 2014, and 0 otherwise. RUS_j is a dummy variable that takes the value of 1 when the export destination is Russia, and 0 otherwise and $Country_j$ (j=0…37) represents every country in the constructed panel dataset. Finally, $PostBan_t$*RUS_j and $PostBan_t$*$Country_j$ are the two interaction terms that represent the parameters of interest in testing hypothesis 2 and 3, respectively. In the following paragraphs, these interaction terms will be explained in more detail.

TABLE 3: VARIABLES HYPOTHESES 2 & 3

VARIABLES	DESCRIPTION	UNIT
$Ln(Export_{jt})$	Value of sanctioned commodities, exported from the Netherlands to destination j	Monthly figures in millions of euros
$Ln(Export^{k}_{jt})$	Sectoral value of sanctioned commodities, exported from the Netherlands to destination j	Monthly figures in millions of euros
$Ln(GDP_{jt})$	GDP of destination j	Monthly figures in millions of euros
$Ln(GDP_{NLt})$	GDP of the Netherlands	Monthly figures in millions of euros
RUS_j	Dummy variable taking value 1 when destination j is Russia	Dummy (1/0)
$Post\_Ban_t$	Dummy variable taking value 1 after August 2014	Dummy (1/0)
RUS_j*$Post\_Ban_t$	Interaction variable	Dummy (1/0)
$Country_j$	j Dummy variable taking value of 1 when destination is country j	Dummy (1/0)
$Post\_Ban_t$*$Country_j$	Interaction variable	Dummy (1/0)
D2012– D2017	Time dummies	Dummy (1/0)
Observations	2,612	
Number of Countries	37	

6.3 **Descriptive Statistics**

Figure 7 illustrates the importance of the Russian market for Dutch exporters as it shows which percentage of global sanctioned exports was send to Russia. Prior to the Ban, more than 2,5 percent of the monthly global value of the export of sanctioned commodities was generated via

[59] The quarterly figures were converted into monthly equivalents conform the cubic spline interpolation method.
[60] *Appendix 10.3* lists all countries that are included into the final panel dataset.

the Russian export market while this percentage decreased significantly post-Ban and remained somewhere between 0.5 and 1 percent.[61] On a sectoral level, the importance of the Russian export market is even more evident when looking at the sectors bovine and dairy (figure 8). At the peak, almost 6 (3) percent of global dairy (bovine) export was send to Russia. Whereas August 2014 marks a clear distinction for dairy exports, this distinction is not as evident for bovine exports as the export value generated through Russia was already decreasing since early 2014. Figure 9 displays the percentages in the sectors fish and vegetable-fruit. The figure shows that the percentage of fish starts at 1 percent and decreases slowly to something around 0.5 percent. The percentage of vegetable-fruit reaches more than 2,5 percent in early 2014 and decreases to somewhere between 1,5 and 0,5 percent. These values imply that the effect of the Ban was less prominent in these sectors. For fish exports, this can be explained by the initial low level of exports. For vegetable-fruit exports, this may be attributed to the previously introduced convergence issues that were particularly prominent in this sector.

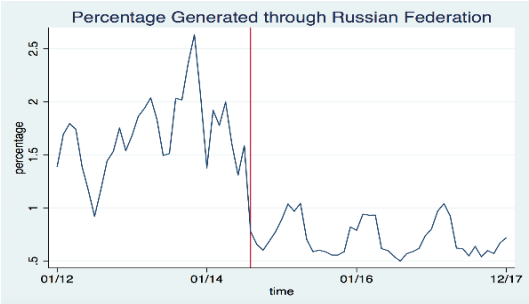

Figure 7: Percentage of Total Export Value Generated through the Russian Federation

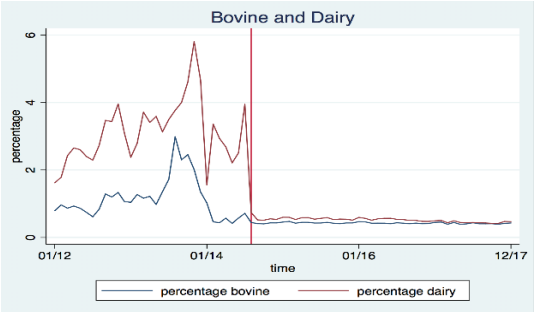

Figure 8: Percentages Bovine and Dairy Sector

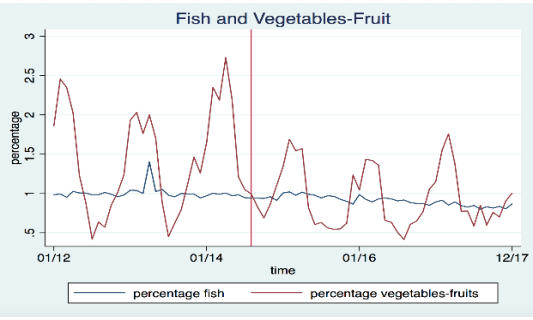

Figure 9: Percentages Fish and Vegetables-Fruit Sector

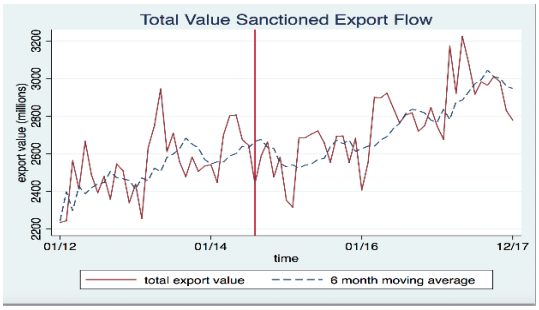

Figure 10: Global Value Sanctioned Export Flow

[61] The non-zero value of this export flow in the post-Ban period can be attributed to the previously discussed convergence issues due to which the export flow of sanctioned commodities became somewhat polluted with non-sanctioned commodities.

Figure 10 displays the development of total sanctioned export flow on a global scale. Both the actual export value and the 6-month moving average of the export value are presented. The figure shows that the value of total sanctioned export flow has increased with 800 million since the beginning of 2012. As the world was recovering from the Financial Crisis that ended in 2011, countries were able to increase their international trade and as a result, Dutch farmers were able to export more. This figure clearly shows periods of intensive growth, especially between 2012 – 2014 and late 2015 – 2018. However, between August 2014 and late 2015, the export growth stabilized and even decreased around early 2015.

As the Ban was installed in this period, showing that this decrease was due to the Ban would provide evidence to hypothesis 2. As demand for sanctioned commodities decreased in the post-Ban period, this may have resulted in a stagnation of export growth. The following paragraph will examine the trade destructive effect of the Russian Ban on the export value of sanctioned commodities on a global scale.

By late 2015, the export growth seemed to have recovered and was back on its original path. This could be because Dutch exporters by then had adapted their trade to the new status quo, for instance by increasing exports to existing trade partners or by exploring new markets. This raises the question: to which countries did Dutch exporters successfully divert their trade? Paragraph 4 addresses this question and investigates the export value increase by destination after the Russian Ban was installed.

6.4 **Trade Destruction on Global Scale**

This paragraph will quantify the impact of the Ban on the value of sectoral sanctioned export flows on a global scale. In doing so, the basic gravity equation is modified into the following:

$$Ln(Export_{jt}) = \beta_1 \ln(GDP_{jt}) + \beta_2 ln(GDP_{NLt}) + \beta_3 PostBan_t + \beta_4 Rus_j * PostBan_t + \beta_5 D2013 + \beta_6 D2014 + \beta_7 D2015 + \beta_8 D2016 + \beta_9 D2017 + \beta_{10} Country_j + \varepsilon_{jt} \quad (9)$$

in which the dependent variable represents the logarithm of the total monthly sanctioned export flow in millions of euros to destination j. Besides this, equation (9) will be estimated in four alternative specifications in which each different agri-food sector will serve as the dependent variable. $Ln(GDP_{jt})$ and $ln(GDP_{NLt})$ represent month t GDP in millions of euros of destination j and the Netherlands, respectively. Since theory tells us that the economic sizes of countries are positively correlated with bilateral export flows between those countries, these variables are expected to have positive signs. $PostBan_t$ is a dummy that takes the value of 1 in the post-Ban period.[62] Its sign is unknown as the total value of sanctioned export flow decreased immediately

[62] In order to from a correctly specified equation, both variables that together form the interaction term have to be included. However, since RUS_j is a time invariant variable, the result is dropped from the regression due to multicollinearity, when estimating the regression with fixed effects. Therefore, the variable RUS_j is not included in equation 10.

after the Ban, but later increased. The interaction term Rus_j*$PostBan_t$ measures the causal effect of the Ban on the value sanctioned export flow in month t. Its coefficient, β_4, is the parameter of interest. It is expected that the total value of sanctioned export flow decreased in the post-Ban period. However, the descriptive statistics of paragraph 5.3 and 6.3 have pointed out that the Ban affected some sectors more than others. While the effect in the bovine and dairy sector was severe, the impact on the vegetable-fruit sector was less significant. Moreover, it appeared that the Ban did not significantly impact the value of sanctioned exports in the fish sector. Taking this in consideration, β_4 is expected to have a negative statistically significant sign in the bovine, dairy and vegetable-fruit sector, whereas in the fish sector it is expected that the coefficient remains statistically insignificant. A set of time dummies is included in order to capture any global time trends.[63] Besides this, the variable $Country_j$ is included in order to capture destination fixed effects. Finally, ε_{jt} represents the stochastic error term. Since equation (9) is estimated with fixed effects, time invariant factors are excluded from the regression. *Appendix 10.4* estimates equation (9) in a different specification.[64]

6.4.1 Interpretation of regression coefficients

Table 4 shows the regression results of the estimation of equation (9) with destination fixed effects and robust errors. In the first column, the logarithm of the value of total sanctioned export flows serves as the dependent variable of the regression. In the remaining columns, the logarithm of the value of sectoral sanctioned export flows are displayed. As the regression is represented in a log-log form, the reported results should be interpreted as elasticities.[65] In column (1), the significant and positive result for $Ln(GDP_{jt})$ indicates a positive relation between the GDP of destination j and the value of total export flows to this destination. More specifically, the result shows that a 10% increase in the GDP of destination j leads to a 2.50% increase in the value of the exported flow to this destination. This positive relation is consistent with the theory. Surprising is the negative coefficient of $Ln(GDP_{NLt})$. However, as it is only significant to the 10% level, the coefficient remains uninterpreted. As the result of the interaction term RUS_j*$PostBan_t$ is statistically significant, it can be interpreted. In order to provide an understandable interpretation of this parameter, the elasticity is converted into a percentage.[66] The converted elasticity indicates that the Ban appears to have negatively influenced total sanctioned export flow with 8.29%. The coefficients of the time dummies 2013 and 2014 have positive signs, indicating that the value of export flow increased in these years, while the negative result in 2015 indicates a decrease, relative to the value of export flow in 2012. In 2016 and 2017,

[63] Time dummy D2012 is not included in order not to fall in a dummy trap.
[64] Traditionally, the gravity equation involves certain socio-economical or geographical control variables that can improve the specification of the equation as they may impact bilateral costs of trade. However, since equation 10 will be estimated with fixed effects, these variables do not have to be separately included. In *Appendix 10.4*, equation 10 is estimated without fixed effects and with a set of control variables in order to examine how the regression coefficients change when certain cultural or geographical dummies are included.
[65] For example, in the bovine sector, a 10 % increase in GDP_{jt} leads to a 2.89 % increase in $Bovine_{jt}$.
[66] In order to convert this elasticity into percentages, the regression results are converted according to the following: $(e^{\beta n} - 1) * 100\%$.

the value of sanctioned export flow increased, relative to the value in 2012. Finally, the coefficient of $Country_j$ shows the average of the destination fixed effects.

TABLE 4: ESTIMATION OF EQUATION 9

DEPENDENT VARIABLE:	(1) $Ln(Export_{jt})$	(2) $Ln(Bovine_{jt})$	(3) $Ln(Dairy_{jt})$	(4) $Ln(Fish_{jt})$	(5) $Ln(Veg\text{-}Fruit_{jt})$
$Ln(GDP_{jt})$	0.250***	0.289**	0.362***	0.148**	0.123
	(0.0760)	(0.131)	(0.0885)	(0.0649)	(0.0854)
$Ln(GDP_{NLt})$	-0.350*	0.0634	0.117	0.0357	-0.620
	(0.200)	(0.129)	(0.128)	(0.0923)	(0.0163)
$Rus_j*PostBan_t$	-0.0797***	-0.0777***	-0.1654***	-0.0198	-0.0357*
	(0.0192)	(0.00320)	(0.00240)	(0.0191)	(0.0296)
$PostBan_t$	-0.0320	0.0384	-0.0231	6.22e-05	-0.0970**
	(0.0201)	(0.0300)	(0.0191)	(0.0229)	(0.0386)
$D2013$	0.0408*	-0.00589	0.0625***	-0.00842	0.0749***
	(0.0236)	(0.0232)	(0.0181)	(0.00953)	(0.0183)
$D2014$	0.0712***	-0.0198	0.0555***	0.0176	0.147***
	(0.0184)	(0.0346)	(0.0161)	(0.0153)	(0.0350)
$D2015$	-0.104**	0.000107	-0.0799***	0.0420	-0.179***
	(0.0656)	(0.0393)	(0.0256)	(0.0272)	(0.0388)
$D2016$	0.148***	0.0344	-0.0930**	0.0822**	0.239***
	(0.0356)	(0.0553)	(0.0381)	(0.0344)	(0.0428)
$D2017$	0.198***	0.000296	0.178***	0.114***	0.330***
	(0.0423)	(0.0502)	(0.0444)	(0.0391)	(0.0610)
$Country_j$	4.199***	1.398***	1.171**	1.193***	4.630***
	(0.419)	(0.337)	(0.558)	(0.342)	(0.738)
Observations	2,612	2,612	2,612	2,612	2,612
R-squared	0.285	0.108	0.484	0.098	0.144
Number of Countries	37	37	37	37	37

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

The obtained results in the remaining columns of table 4 show that, consistent with prior expectations, $Ln(GDP_{jt})$ has a positive impact on the value of exported commodities in the sectors bovine, dairy and fish. The coefficients of $Ln(GDP_{NLt})$ are all insignificant, indicating that Dutch GDP does not causally impact the value of sanctioned export flows. Though insignificant, the coefficients do have the expected signs in three of the four sectors. The coefficient of the $PostBan_t$ dummy is significant and negative in the vegetable-fruit sector, indicating that the value of vegetable-fruit exports developed negatively in the post-Ban period. The effect of the interaction term $RUS_j*PostBan_t$, is most significant in the bovine and dairy sector, where coefficients are statistical significant to the 1% level. For the vegetable-fruit sector, the significance falls to a 10% level and it completely disappears in the fish sector. This is in line with the descriptive statistics of paragraphs 5.3 and 6.3 where it was found that the Ban greatly impacted the bovine and dairy sector, while fish and vegetable-fruit exports were only marginally affected. In line with the descriptive statistics of paragraph 6.3, the economic effect appears to be most significant in the bovine (-8.07%) and dairy (-17.98%) sector whereas the economic significance is least notable in the vegetable-fruit sector (-3.63%). The insignificant coefficient of the fish sector

indicates that the Ban did not have a causal impact on the sanctioned export flow and that this coefficient does not require interpretation. Besides this, the obtained insignificant result confirms the assumption that the Ban did not impact the value of sanctioned exports in the fish sector, which supports the validity of the conducted methodology.

6.4.2 Concluding remarks

This paragraph addressed the trade destructive impact of the Ban on a global scale. The results of table 4, column 1 show that GDP of destination j and total sanctioned export flow are positively correlated, while Dutch GDP does not seem to have a statistical significant effect. Besides this, the results have shown that the Ban has negatively influenced the value of total sanctioned exports with 8.29%. The remaining columns of table 4 show that the impact of the Ban was highest in the bovine and dairy sector and lower in the vegetable-fruit and fish sector. A possible reason for the reduced impact in the vegetable-fruit sector can be found in the previously discussed convergence issues that were most prominent in this sector. Because of that, it was difficult to isolate the impact of the Ban with a likely repressing effect on its actual impact. The coefficient of the interaction term did not produce a statistically significant result in the fish sector, indicating that the Ban did not have a causal effect in this sector. The expected insignificant coefficient in this sector supports the correctness of the used methodology. The findings of this paragraph have shown that the Ban indeed caused a decrease in the value of sanctioned export flow in a number of sectors, providing supportive evidence for hypothesis 2.

This paragraph has established global trade destruction caused by the Ban. The next paragraph will address hypothesis 3 and assess the flexibility of Dutch exporters by verifying if Dutch exports have successfully diverted their trade to other destinations.

6.5 **Trade Diversion**

When country *j* installs certain trade restrictions, one can interpret this as an increase in bilateral trade costs between country *i* and *j* relative to the trade costs of country *i* and the rest of the world. As a consequence, trade between country *i* and *j* is expected to decrease whereas trade with the rest of the world is expected to increase. While the previous sections have established the trade destructive impact of the Ban both on a bilateral and global scale, this section examines the flexibility of Dutch exporters by assessing if, and if so, to which destinations they diverted their trade in the aftermath of the Ban. The naive gravity equation is extended into the following:

$$Ln(Export_{jt}) = \beta_1 \ln(GDP_{jt}) + \beta_2 ln(GDP_{NLt}) + \beta_3 PostBan_t + \beta_4 Postban_t * Country_j + \beta_5 D2013 + \beta_6 D2014 + \beta_7 D2015 + \beta_8 D2016 + \beta_9 D2017 + \beta_{10} Country_j + \varepsilon_{jt} \quad (10)$$

in which $\ln(Exports_{jt})$ represents the logarithm of the total monthly sanctioned export flow in millions of euros to destination j. Like in the previous paragraph, equation (10) will be estimated in four alternative specifications in which each different agri-food sector will serve as

the dependent variable. $Country_j$ represents every destination in the constructed panel dataset, except for Russia which serves as the base country. The coefficients β_1 - β_3 are expected to have the same signs as in the previous paragraph. The interaction term $PostBan_t$*$Country_j$ measures how sanctioned export flows to all destinations changed in the post-Ban period. A significant and positive coefficient indicates an increase in export flows to destination j. Since it is predicted that Dutch exporters have diverted their trade in order to deal with their excess supply, it is expected that the coefficient of the interaction term indeed turns out to be positive for some destinations. $PostBan_t$ is included in order to properly specify equation (10),[67] $Country_j$ to account for any time unvarying destination fixed effects that may influence $Ln(Export_{jt})$ and a set of time dummies to capture any global time trends. Finally, ε_{jt} represents the stochastic error term.

6.5.1 Interpretation of regression coefficients

Table 5 shows the result of the estimation of equation (10) in which the logarithm of the value of total sanctioned export flow serves as dependent variable. In the table, the top 5 destinations with the biggest post-Ban export increase are shown.[68] The table displays a positive coefficient for $Ln(GDP_{jt})$, confirming the theory that bigger countries trade more. The coefficient of $Ln(GDP_{NLt})$ will not be interpreted as the coefficient is not statistically significant to the 5% level or less. Besides this, tables 5 provides positive and significant results for the interaction term

TABLE 5: ESTIMATION OF EQUATION 10 ON TOTAL SANCTIONED EXPORT FLOW

DEPENDEND VARIABLE:	$Ln(Export_{jt})$
$Ln(GDP_{jt})$	0.184***
	(0.0494)
$Ln(GDP_{NLt})$	-0.299*
	(0.1907)
China	1.578***
	(0.0211)
USA	1.001***
	(0.0206)
Switzerland	0.975***
	(0.0195)
Belgium	0.926***
	(0.0151)
Poland	0.909***
	(0.0228)
Observations	2,612
R-squared	0.488
Number of Countries	37

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

[67] In order to from a correctly specified equation, the regression has to include both variables that together form the interaction term. However, since $Country_j$ is time invariant, it is dropped from the regression due to multicollinearity when estimating the regression with fixed effects.
[68] In order to let the tables remain comprehensible, the regression results of the $Time_t$, $PostBan_t$ and $Country_j$ dummies are not shown.

$PostBan_t$*$Country_j$. According to the table, Dutch exporters have enormously increased their trade to China by 384%, followed by the USA (172%) and Switzerland (167%).

Tables 6 - 9 show the results of the estimation of equation (10) for each agri-food sector. Not surprisingly, the coefficient of $Ln(GDP_{jt})$ is positive in all and significant in most sectors, confirming the theory that bigger countries trade more. The insignificant coefficient of $Ln(GDP_{NLt})$ in most sectors indicates that the economic size of the Netherlands does not influence

TABLE 6: ESTIMATION BOVINE

DEP. VARIABLE:	Ln(Bovine$_{jt}$)
Ln(GDP$_{jt}$)	0.172***
	(0.0466)
Ln(GDP$_{NLt}$)	0.0269
	(0.0709)
China	1.487***
	(0.0199)
Australia	0.0976***
	(0.0120)
Belgium	0.0955***
	(0.0143)
Ireland	0.0952***
	(0.0245)
Spain	0.0868***
	(0.0176)
Observations	2,612
Number of Countries	37
R-squared	0.532

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

TABLE 7: ESTIMATION DAIRY

DEP. VARIABLE:	Ln(Dairy$_{jt}$)
Ln(GDP$_{jt}$)	0.287***
	(0.0748)
Ln(GDP$_{NLt}$)	-0.0594
	(0.109)
China	1.357***
	(0.0320)
Mexico	0.185***
	(0.0358)
USA	0.184***
	(0.0312)
Belgium	0.181***
	(0.0229)
Poland	0.175***
	(0.0183)
Observations	2,612
Number of Countries	37
R-squared	0.576

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

TABLE 8: ESTIMATION FISH

DEP. VARIABLE:	Ln(Fish$_{jt}$)
Ln(GDP$_{jt}$)	0.0933*
	(0.0486)
Ln(GDP$_{NLt}$)	0.00665
	(0.0885)
Spain	0.203***
	(0.0183)
Australia	0.201***
	(0.0225)
Belgium	0.198***
	(0.0149)
United Kingdom	0.180***
	(0.0166)
Germany	0.132***
	(0.0181)
Observations	2,612
Number of Countries	37
R-squared	0.228

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

TABLE 9: ESTIMATION OF VEGETABLE FRUIT

DEP. VARIABLE:	Ln(Veg-Fruit$_{jt}$)
Ln(GDP$_{jt}$)	0.126
	(0.0753)
Ln(GDP$_{NLt}$)	-0.622***
	(0.154)
Switzerland	0.681***
	(0.0297)
USA	0.547***
	(0.0314)
Latvia	0.527***
	(0.0241)
Hungary	0.478***
	(0.0309)
Brazil	0.474***
	(0.0128)
Observations	2,612
Number of Countries	37
R-squared	0.201

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

the size of total export flow in a meaningful way. Only in the sector vegetable-fruit, the coefficient takes on a significant and negative value. This implies that in this sector, an increase in Dutch GDP leads to a decrease in the export value. Taking a first glance at the tables, one can see that the enormous increase to China is also visible on a sectoral level. As a matter of fact, the growth percentages in the bovine and dairy sector were 342,38% and 288.45% respectively. In the vegetable-fruit sector, Switzerland increased its imports in the aftermath of the Ban with 97.5%, while the value of sanctioned exports to Spain in the fish sector increased with 23.36 %.

Tables 6 – 9 show that Belgium, Spain, the United Kingdom and Germany appear in the top 5 of several sectors. Belgium even in three out of four. This can be explained by the fact that these countries are considered to be closely tied to the Netherlands, both economically and culturally, with low bilateral trade costs between the Netherlands and these countries. As a result, it could be expected that export flows to these countries increased post-Ban.

The obtained growth percentages to China are remarkable since bilateral trade costs between the Netherlands and China are considered to be high due to the distance between both countries and the absence of other specific socio-economic factors. The enormous increase of the value of exports in the bovine and diary sector was not expected. Interestingly, it seems that Dutch exporters could handle higher bilateral trade costs when diverting their trade.

In order to provide additional insight in these results, figures 12-15 of *appendix 10.5* show the destinations with the highest increase of Dutch sanctioned export flow after the Ban was installed. Figures 12 and 13 show the substantial increase of the value of export flow to China. The initial monthly value of sanctioned export flow to China was between 3 million euros (bovine sector) and 5 million (dairy sector) euro. After the Ban was installed, these values increased rapidly. The initial low value of the export flows and the strong increase after the Ban, explain the magnitude of the obtained growth percentages.

A final interesting result of this section can be observed in table 9, which reports the presence of Latvia and Hungary, two eastern European countries. A recent article in the *Volksrant* claimed that Dutch exporters of fruit (more specifically: conference pears) allegedly circumvent the Ban by transporting their cargo to one of the Balkan countries, where products are repacked and shipped to Russia. The results of table 9, in which two important Balkan countries are presented, can be seen as an indication that the sanction busting activities actually take place.

6.5.2 Concluding remarks

This paragraph has addressed the flexibility of Dutch exports by assessing whether or not Dutch exporters diverted their trade to other destinations in the post-Ban period. The obtained results provide evidence that trade to other destination has indeed increased. Table 5 shows that Dutch exporters enormously increased their trade to China in the aftermath of the Ban. On a sectoral level, the big increase to China is also visible in the bovine (table 6) and dairy sector (table 7). In

the vegetable-fruit sector, the export value seems to have increased most to Switzerland while Spain had the highest increase of imports of sanctioned fish commodities. The results obtained in tables 6-9 are reflected in figures 12-15 in *appendix 10.5*. From the results can be concluded that Dutch exporters have successfully diverted sanctioned commodities to other markets.

7. Robustness & Limitations

In the previous chapters, supportive evidence on the trade destructive effect of the Russian import Ban on a global level was found. However, as the constructed panel dataset was adapted for usage in the log-linearized gravity equation, the obtained results may have been distorted. In order to evaluate the obtained results on their robustness, this chapter will reassess equation (10) with a non-linear technique.[69] After this, the second part of this chapter will discuss some important limitations of the conducted methodology.

7.1 PPML

Paragraph 6.2 elaborated on three central shortcomings related to the log-linearized gravity equation. It also provided ways on how scholars usually overcome these issues. In the previous OLS estimations, the study at hand has adopted the censoring technique in combination with fixed effects in order to deal with the presence of zero's in the trade matrix and the violation of a homoscedastic error term. However, the possibility of estimating the gravity equation in a non-linear form, using the PPML technique, has also been briefly discussed. Since its development by Santos & Tenreyro in 2006, this technique has been used by influential economists such as Linders and the Groot (2006), Helpman, Melitz and Rubenstein (2008) and Burger (2009).

In their paper, Santos Siliva & Tenreyro (2006) discuss an important flaw of the log-linearized form of the gravity equation. They argue that even if all trade flow observations are strictly positive (non-zero), log linearizing the gravity equation remains inappropriate because it changes the property of the error term. As a solution, they suggest that unbiased and consistent parameters, robust to heteroscedasticity, are best obtained by using non-linear estimations. Because the PPML method does not involve linearization, Siliva & Tenreyro introduce it as the new workhorse for estimations such as the gravity model. In order to test the results of table 4 on their robustness, equation (9) will be reassessed according to the PPML technique. For this estimation, the unadjusted dataset is used in which zero-observations are still present. The following equation is estimated:

$$exports_{jt} = exp\left[\beta_1 \ln(GDP_{jt}) + \beta_2 ln(GDP_{NLt}) + \beta_3 PostBan_t + \beta_4 PostBan_t * Rus_j + \beta_5 D2013 + \beta_6 D2014 + \beta_7 D2015 + \beta_8 D2016 + \beta_9 D2017\right] + \varepsilon_{jt} \quad (11)$$

[69] If the estimations of equation (9) appear to be robust, it can be assumed that estimations for equation (10) are robust too since both these regressions are based upon the same panel dataset and are tested within the same theoretical framework. Hence, only the estimates of equation (9) will be checked on their robustness.

7.1.1 Interpretation of results

Table 10 reports the results of the estimation of equation (11). As this equation is not log-linearized, the dependent variable can be interpreted as the level of sectoral Dutch sanctioned export flows to destination j. In order to evaluate the results of table 10, they are compared with the results of table 4 that were obtained in the original OLS estimation of equation (9). From the tables can be derived that, even though there are differences in magnitudes, most signs and significances of coefficients are similar. Column (1) of table 10 shows that, consistent to table 4, GDP of destination j has a positive sign. The interaction term Rus_j*$PostBan_t$, parameter of interest, has produced a negative and significant result, consistent with the result obtained in table 4. The magnitude of the coefficient is slightly greater in table 10 as the Ban is considered to have had a negative effect of 11,2%, as opposed to the negative effect of 8.29% in table 4.

TABLE 10: ESTIMATION EQUATION 11

DEPENDENT VARIABLE:	(1) $Export_{jt}$	(2) $Bovine_{jt}$	(3) $Dairy_{jt}$	(4) $Fish_{jt}$	(5) $Veg\text{-}Fruit_{jt}$
$Ln(GDP_{jt})$	0.00776*	0.00154***	0.00152***	0.000613	0.00348***
	(0.00434)	(0.000504)	(0.000512)	(0.000762)	(0.000423)
$Ln(GDP_{NLt})$	0.00193	0.00181	0.00521***	0.00314	-0.00899***
	(0.107)	(0.00139)	(0.00152)	(0.00217)	(0.00110)
Rus_j*$PostBan_t$	-0.1120***	-0.0985***	-0.1082***	-0.114	-0.0398***
	(0.00395)	(0.0111)	(0.0100)	(0.139)	(0.00679)
$PostBan_t$	-0.0368	0.0572**	0.0356	0.0848**	-0.173***
	(0.0261)	(0.0257)	(0.0286)	(0.0415)	(0.0210)
D2013	0.0761***	0.00168	0.129***	-0.0243	0.0948***
	(0.0114)	(0.0167)	(0.0190)	(0.0275)	(0.0137)
D2014	0.0106	-0.00755	0.112***	-0.0111	0.164***
	(0.0207)	(0.0206)	(0.0230)	(0.0334)	(0.0165)
D2015	0.0158	-0.000337	0.130***	-0.00753	0.232***
	(0.0281)	(0.0296)	(0.0334)	(0.0480)	(0.0241)
D2016	0.227***	0.0333	0.194***	0.0700	0.317***
	(0.0352)	(0.0299)	(0.0336)	(0.0483)	(0.0242)
D2017	0.308***	0.0192	0.289***	0.119**	0.441***
	(0.0464)	(0.0301)	(0.0335)	(0.0484)	(0.0243)
Observations	2,612	2,612	2,612	2,612	2,612
Number of Countries	37	37	37	37	37

In columns 2-5, GDP of destination j has a positive sign in all sectors and is statistically significant in the bovine and dairy sector. Though insignificant, Dutch GDP has a positive sign in all but the vegetable-fruit sector, which is consistent with the results from table 4.

When looking at the interaction term Rus_j*$PostBan_t$, parameter of interest, the estimation of equation (11) produces statistically significant and negative estimates in the sectors bovine, dairy and vegetable-fruit. Consistent with table 4, the coefficient of the interaction term remains insignificant in the fish sector, supporting the validity of the conducted methodology. Besides the statistical significance, the economic interpretation of the coefficients can be considered comparable as well. In the bovine and dairy sector, the Ban has caused sanctioned exports to

decrease with 9.85% and 10.82 %, respectively, while it had the smallest effect in the vegetable-fruit sector in which sanctioned export flow decreased with 3.98%. Because these percentages are of similar magnitude compared to the original OLS estimation of equation (9) (where it was estimated that the Ban had caused a decrease of 8.07%, 17.98% and 3.63% in the bovine, dairy and vegetable-fruit sector, respectively), the obtained estimates of table 4 can be considered robust.

7.2 **Limitations**

The study at hand is influenced by two types of limitations: limitations related to the used trade data and limitations related to assumed causalities. This paragraph will explain and address both these limitations.

7.2.1 Data related limitations

The data obtained from the CBS contains two important limitations. The first limitation is related to the convergence issues that occurred when transforming the CN4-class trade data to 3-digit SITC. Due to the fact that not all listed 4-digit CN products could be separately identified in the 3-digit SITC data, sanctioned commodities could not be completely distinguished form non-sanctioned commodities. As a result, the data stream of sanctioned commodities became somewhat polluted with non-sanctioned commodities which may have resulted in biased estimators.

Secondly, the monthly export values obtained from the CBS are expressed in numbers, rounded up to millions of euros.[70] The export value to a certain country has to reach the threshold value of 0.5 million in order to become visible in this dataset. This unfortunate feature of the trade data leads to a loss of information. It could be possible that some countries experienced a strong increase (or decrease) after the Ban was installed, relative to the period before the Ban, but in case this increase remained below the threshold, it was not recorded.

7.2.2 Causality related limitations

Another limitation is related to the assumed causality. In the previous chapters, it was found that the Ban has negatively impacted sanctioned Dutch export flows to Russia. Even though it seems valid that the Ban can be responsible for the decrease export value, the question remains if it was the only relevant factor. The Russian economy has always been highly depended on the development of the global price for crude oil and natural gas. In order to illustrate: in 2013, the exports of crude oil, natural gas and related products was good for two-thirds of the country's total exports. The drop of European demand in 2014 (Russia's key market) and the decision of OPEC's to maintain high levels of oil production resulted into a dramatic decrease of crude oil

[70] As 0.499 million is rounded to 0 and 0.501 million to 1, this leads to loss of information.

price (Kholdilln & Dreger, 2015). Figure 8 displays the development of the crude oil price from January 2014 to March 2015. The huge price decrease, in combination with the sanctions imposed because of the annexation of the Krim, led to a decrease in the exchange rate of the ruble (Nelson, 2014). Because of a rapid devaluation of the ruble, the Russian Federation lapsed into a currency crisis (Mironov, 2015). An important question would be to which extent the Ban and to which extend the ruble currency crisis were accountable for the decrease in Russian demand since both events seem to have had an impact in the same period. Further research is required to thoroughly answer that question which is beyond the scope of this thesis.

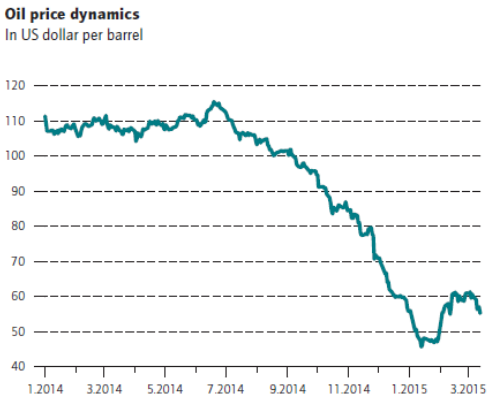

Figure 11: Oil Price Dynamics
Source: Kholdilln & Dreger (2015)

8. Conclusion & Future Research

8.1 Conclusion

This thesis has aimed to demonstrate the impact of the Russian import Ban on Dutch export flows in the agri-food industry. Influenced by the topic's economic and political relevance, the effect of the Ban has been addressed both at a bilateral level between the Netherlands and the Russian Federation, and on a global level between the Netherlands and all 37 destinations that were included into the dataset. The tested hypotheses were formulated in such a way that they all addressed a certain aspect of the investigated issue.

The first hypothesis empirically tested if the value of sanctioned exports to Russia has decreased post-Ban. If this had not been the case, Dutch sanctioned export flows were likely not affected by the Ban and, consequently, it would not have made much sense continuing with the investigation of hypotheses 2 and 3. The results obtained from the DID analysis provided evidence that supported hypothesis 1, as it was found that the value of the sanctioned export flow decreased with 23.24 million per month, relative to the value of non-sanctioned export flow.

Hypothesis 2 and 3 addressed the reaction of Dutch export flow on a global scale. Following the literature, these hypotheses were tested within the gravity framework. Hypothesis 2 addressed the trade destructive influence of the Ban on a global scale. In order to provide a comprehensive analysis, the influence of the Ban was investigated both on total as on sectoral sanctioned export flows. The basic gravity equation was extended with the interaction term RUS_j*$PostBan_t$, that quantified the global effect of the Ban. It was quantified that the Ban negatively influenced total sanctioned export flow with 8.29%. Besides this, as expected, the interaction term generated significant and negative coefficients in all, but the fish sector. Furthermore, the effect of the Ban was greatest in the dairy sector (-17.98%), followed by the

bovine industry (-8.07%), while it had the smallest effect in the vegetable-fruit industry (-3.63%). As expected, the interaction did not produce a significant result in the fish sector, which supports the validity of the conducted methodology.

Finally, hypothesis 3 assessed the flexibility of Dutch exporters and their ability to successfully divert their trade in the aftermath of the Ban. For this aim, the interaction term $PostBan_t$*$Country_j$ was constructed. It was expected that this interaction term generated significant and positive coefficients for at least some destinations. The results indicated that Dutch exporters increased the value of total sanctioned export flow most to China with 384%. This increase is reflected on a sectoral level, where the obtained results showed that the value of sanctioned export flow in the bovine and dairy sector increased to China with 342,38% and 288.45%, respectively. Besides this, exporters in the vegetable-fruit sector have diverted their export flows most to Switzerland as the value of exports in this sector increased with 97.5%. In the fish sector, the coefficient generated by the interaction term was smallest in terms of magnitude as it was found that exports to Spain increased by 23.36%. Interestingly, it seems that Dutch exporters do not seem to be inhibited by high bilateral trade costs when diverting their trade. Another interesting result in this section was the presence of two important Balkan destinations in the top 5 of the vegetable-fruit sector as this presence can be seen as an indication that sanction busting activities take place.

In order to provide a robustness check, equation (9) was estimated with a non-linear technique. It was found that the results, obtained from estimating equation (11) did not substantially differ from estimating equation (9), hereby supporting the initial results of table 4 on their robustness.

The final conclusion of this thesis is that the Russian Ban indeed has left its mark on Dutch export flows in the agri-food industry. This impact was noticeable both on a bilateral level between the Netherlands and the Russian Federation, as well as on a global level between the Netherlands and all 37 countries included in the dataset. Post-ban, the Netherlands were successful in diverting their trade of banned products to other countries. With those results this thesis has added to the literature on the specific influence of economic sanctions on trade patterns.

8.2 **Future Research**

As described earlier this thesis experienced two important data related issues which may have distorted the regression estimations to some extent. 1 - Due to the convergence issues, the sanctioned data stream is likely to be polluted with non-sanctioned commodities, which might have biased the estimated regression coefficients. It is advised that future research is done with further disaggregated trade data in order to improve the distinction between sanctioned and non-sanctioned commodities. 2 - The data obtained from the CBS reported monthly export values figures that were rounded up to millions of euros. This has made the trade data less detailed.

Therefore, it is advised that future research uses trade data that is more comprehensive in order to provide finer granularity on the causal effects.

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10. Appendices

10.1 Unofficial Translation of Decree no. 778 Concerning the Sanctioned Products

Unofficial translation

GOVERNMENT OF THE RUSSIAN FEDERATION

RESOLUTION

Of 20 August 2014 No.830

Moscow

On the introduction of changes in the Resolution of the Government of the Russian Federation of 7 August 2014 No.778

The Government of the Russian Federation decrees as follows:

To approve the enclosed changes which are introduced in the Resolution of the Government of the Russian Federation of 7 August 2014 No.778 "On measures for implementation of the Decree of the President of the Russian Federation dated August 6, 2014 № 560 "On the application of certain special economic measures to ensure the security of the Russian Federation" (Official internet-portal of legal information (www.pravo.gov.ru), 7 August 2014, No. 00012014080070021).

Chairman of the Government of the Russian Federation

D.Medvedev

APPROVED
By the Resolution of the Government
Of the Russian Federation
Of 20 August 2014 No.830

CHANGES

Which are introduced in the Resolution of the Government of the Russian Federation of 7 August 2014 No.778

To put the list of agricultural products, raw materials and foodstuffs originating from the United States, countries of the European Union, Canada, Australia and the Kingdom of Norway, and that are banned for imports to the Russian Federation for a period of one year, foreseen by the indicated Resolution, as follows:

ANNEX
To the Resolution of the Government of the Russian Federation of 7 August 2014 No.778
(in edition of the Resolution of the Government of the Russian Federation
of 20 August 2014 No.830)

List of agricultural products, raw materials and foodstuffs originating from the United States, countries of the European Union, Canada, Australia and the Kingdom of Norway, and that are banned for imports to the Russian Federation for a period of one year

CN CODE	List of products *) ***)
0201	Meat of bovine animals, fresh or chilled
0202	Meat of bovine animals, frozen
0203	Pork, fresh, chilled or frozen
0207	Meat and edible offal of the poultry indicated in line 0105, fresh, chilled or frozen
Out of 0210 **	Meat salted, in brine, dried or smoked
Out of 0301**	Live fish (excluding hatchlings of salmon (Salmo salar) and trout (Salmo trutta)
0302, 0303, 0304, 0305, 0306, 0307, 0308	Fish and crustaceans, molluscs and other aquatic invertebrates
Out of 0401**, out of 0402**, Out of 0403**, out of 0404**, Out of 0405**, out of 0406**	Milk and dairy products (excluding lactose-free milk and lactose-free milk products)
0701 (excluding 0701 10 000 0), 0702 00 000, 0703 (excluding 0703 10 110 0), 0704, 0707 00, 0708, 0709, 0710, 0711, 0712 (excluding 0712 90 110 0), 0713 (excluding 0713 10 100 0), 0714	Vegetables, edible roots and tubers (excluding seed potatoes, seed onion, sugar maize hybrid for planting, peas for planting)
0801, 0802, 0803, 0804, 0805, 0806, 0807, 0808, 0809, 0810, 0811, 0813	Fruit and nuts
1601 00	Sausages and similar products of meat, meat offal or blood; final food products based thereon
Out of 1901 90 110 0**, Out of 1901 90 910 0** Out of 2106 90 920 0**, Out of 2106 90 980 4**, Out of 2106 90 980 5**, Out of 2106 90 980 9**	Food or finished products (excluding biologically active supplements; vitamin-mineral complexes; flavour additives; protein concentrates (of animal and plant origin) and their mixtures; food fibers; food additives (including complex ones)

* For the purposes of the application of this list, one should be guided solely by the CN CODE, name of product is shown for convenience.

** For the purposes of the application of this position, one should be guided both by a CN CODE, and the name of the product.

*** Except for goods destined for baby food.

10.2 **List of included 3-digit SITC codes**

Sector/Product					
Bovine	011: Meat of Bovine, fresh or frozen	012: Other meat and eatable remains, fresh or frozen	016: Meat and other eatable remains, dried, smoked or salted	017: Preparations and conservations of meat	-
Dairy	022: Milk, cream and other milk products	023: Butter and milkfat	024: Cheese and custard	025: Bird eggs	-
Fish	034: Fish. Fresh cooled or frozen	035: Fish, dried, smoked or salted	036: shellfish or molluscs	037: Preparations of fish, crustaceans, molluscs	-
Vegetables-Fruit	054: Vegetables, fresh, chilled, frozen or simply preserved	056: Vegetables, roots and tubers, prepared or preserved	057: Fruit and nuts (not including oil nuts), fresh or dried	058: Fruit, preserved, and fruit preparations (excluding fruit juices)	059: Fruit juices and vegetables juices, unfermented

10.3 **Countries included in Panel Dataset used for testing Hypotheses 2 and 3**

1. Argentina	20. Luxemburg
2. Australia	21. Mexico
3. Belgium	22. New-Zealand
4. Brazil	23. Norway
5. Chili	24. Poland
6. China	25. Portugal
7. Costa Rica	26. Russia
8. Demark	27. Saudi-Arabia
9. Germany	28. Slovenia
10. Finland	29. Slovak Republic
11. France	30. Spain
12. Greece	31. Czech Republic
13. Hungary	32. Turkey
14. Iceland	33. United Kingdom
15. Ireland	34. United States of America
16. Israel	35. South-Africa
17. Italy	36. Sweden
18. Latvia	37. Switzerland
19. Lithuania	

10.4 **Alternative specification of equation (9)**

In this *appendix*, equation (9) is estimated in a different specification. The aim of this section is to demonstrate what happens when equation (9) is not estimated with fixed effects, but instead with a set of controls variables that represent socio-cultural and geographical factors such as a distance between the two respective capitals or the existence of a common language or common border. According to theory, these variables may be relevant as they have an impact bilateral trade costs.[71] Controlling for these variables usually improves the specification of the regression. Even though the estimation with fixed effect remains preferred as it captures both observable and unobservable time invariant, estimating equation (9) with a certain set of control variables can be interesting for two reasons. First of all, this estimation can be considered as a robustness check. If the signs and magnitudes of the coefficients do not significantly differ from the estimation with fixed effects, this enhances the robustness of the initial outcomes. Second off al, estimating equation 10 without fixed effects makes it possible to analyze the signs and magnitudes of the included control variables and verify if these are consistent with expectations.

For these reasons, equation (9) is reassessed. However, instead of estimating the regression with fixed-effects, a set of control variables that are assumed to affect the export flow through their impact on bilateral trade costs are included. In order to control for the MRT's, the remoteness index is included. The table A lists the variables that are included into the alternative regression.

APPENDIX 10.1: TABLE A

VARIABLES	DESCRIPTION	UNIT
$Ln(Export_{it})$	Value of sanctioned commodities, exported from the Netherlands to destination j	Monthly figures in millions of euros
$Ln(GDP_{it})$	GDP of destination j	Monthly figures in millions of euros
$Ln(GDP_{NLt})$	GDP of the Netherlands	Monthly figures in millions of euros
RUS_i	Dummy variable taking value 1 when destination j is Russia	Dummy (1/0)
$PostBan_t$	Dummy variable taking value 1 after August 2014	Dummy (1/0)
$PostBan_t$*RUS	Interaction variable	Dummy (1/0)
$Ln(Distance_i)$	Distance between Amsterdam and the capital of destination j	Number of Kilometers
$Common\ Language_i$	Dummy Variable	Dummy (1/0)
$Common\ Border_i$	Dummy Variable	Dummy (1/0)
$EU\text{-}Member_i$	Dummy Variable	Dummy (1/0)
$Remoteness_{it}$	Proxy for MRT	Monthly Values
D2012– D2017	Time dummies	Dummy (1/0)
Observations	2,612	
Number of Countries	37	

[71] Bilateral trade costs are represented by t_{ij1} in equation 1.

10.4.1 Interpretation of results

Table B reports the results of the alternative regression. From the table, it becomes clear that estimating equation (9) without fixed effects generates comparable results to the estimation with fixed effects. Like in table, the GDP values of destination j are positively correlated with the dependent variable. Apart from this, the magnitude of the significance and magnitude of the coefficients is similar for all but the vegetable-fruit sector. Unlike in table 4, Dutch GDP produces negative coefficients in all sectors. The obtained estimates for the interaction term and parameter of interest are consistent with the results of paragraph 4. The signs, magnitudes and statistical significance of these results are all comparable. The fact that the results in this section can be compared to the results obtained in table 4, enhances the initial results in their robustness.

In the alternative regression, 5 control variables are added to equation (9). From table B can be deducted that the coefficients of the control variable $distance_j$ are all insignificant, but in the fish sector. The negative coefficient in this sector indicates that export flows of sanctioned fish products negatively correlated to the distance between Amsterdam and the capital of country j. More specifically, a 1% increase in the distance results the export value in millions of euros to decrease with 0.035%. The control variable for common language generates, surprisingly, negative and significant coefficients in all but the fish sector. This result is unexpected and not consistent with the theory. However, since the dataset includes only 1 country with whom the Netherlands shares its language (Belgium), this result might be distorted. The remoteness variable generates negative coefficients, as expected. However, as the coefficients are not statistically significant, their results cannot be interpreted. The dummy variable for destination j being in the European Union does not create results that are statistically significant to the 5 percent. However, the signs of the coefficients do have the expected positive signs. Finally, the results of $Common\ Border_j$ are all strongly significant and strongly positive, indicating that export flows are positively correlated to destination j being a neighboring country. This result is consistent with theory as neighboring countries are expected to have smaller bilateral trade costs which increases bilateral trade flows.

APPENDIX 10.1: TABLE B

DEP. VARIABLE:	(1) $Ln(Export_{jt})$	(2) $Ln(Bovine_{jt})$	(3) $Ln(Dairy_{jt})$	(4) $Ln(Fish_{jt})$	(5) $Ln(Veg\text{-}Fruit_{jt})$
$Ln(GDP_{jt})$	0.269***	0.318***	0.368***	0.175***	0.161*
	(0.0692)	(0.110)	(0.0768)	(0.0587)	(0.0826)
$Ln(GDP_{NLt})$	-0.348***	-0.0783	-0.0824	-0.0472	-0.648***
	(0.0967)	(0.112)	(0.120)	(0.0851)	(0.167)
$Rus_j\_PostBan_t$	-0.785***	-0.767***	-1.652***	-0.0102	-0.343***
	(0.0238)	(0.0351)	(0.0226)	(0.0175)	(0.0301)
$PostBan_t$	-0.0311	0.0384	0.0261	0.000246	-0.0977**
	(0.0204)	(0.0304)	(0.0191)	(0.0228)	(0.0391)
RUS_j	0.457**	0.316	1.211***	-0.428***	0.402
	(0.213)	(0.213)	(0.114)	(0.132)	(0.330)
$Ln(Distance_j)$	0.0945	0.294**	0.162**	0.0187	-0.0525
	(0.136)	(0.122)	(0.0709)	(0.0868)	(0.212)
$Common\ Language_j$	-0.610***	-0.779***	-0.0258	0.163	-1.135***
	(0.153)	(0.166)	(0.102)	(0.101)	(0.223)
$Common\ Border_j$	2.032***	1.718***	1.987***	1.329***	2.714***
	(0.299)	(0.360)	(0.320)	(0.292)	(0.435)
European Union	0.0770	0.794***	0.475***	-0.148	-0.382
	(0.349)	(0.304)	(0.156)	(0.207)	(0.546)
$Euro_j$	0.924***	0.977***	0.783***	0.579**	0.982**
	(0.285)	(0.341)	(0.246)	(0.228)	(0.417)
$Remoteness_{jt}$	0.00223	0.00170	0.00366*	0.00274*	0.00148
	(0.00150)	(0.00212)	(0.00217)	(0.00159)	(0.00113)
D2013	0.0397***	-0.00627	0.0622***	-0.00960	0.0736***
	(0.0138)	(0.0231)	(0.0184)	(0.00930)	(0.0187)
D2014	0.0694***	-0.0205	0.0537***	0.0160	0.146***
	(0.0185)	(0.0345)	(0.0162)	(0.0151)	(0.0354)
D2015	0.105***	0.00123	0.0825***	0.0423	0.179***
	(0.0256)	(0.0389)	(0.0261)	(0.0268)	(0.0388)
D2016	0.149***	0.0360	0.0972**	0.0825**	0.239***
	(0.0354)	(0.0550)	(0.0385)	(0.0341)	(0.0426)
D2017	0.197***	0.000795	0.175***	0.114***	0.331***
	(0.0422)	(0.0497)	(0.0447)	(0.0386)	(0.0613)
Constant	2.952**	-1.714	-0.951	0.836	4.818**
	(1.339)	(1.093)	(0.776)	(0.709)	(2.111)
Observations	2,612	2,612	2,612	2,612	2,612
Number of Countries	37	37	37	37	37

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

10.5 Development of the Value of Sanctioned Export Flow

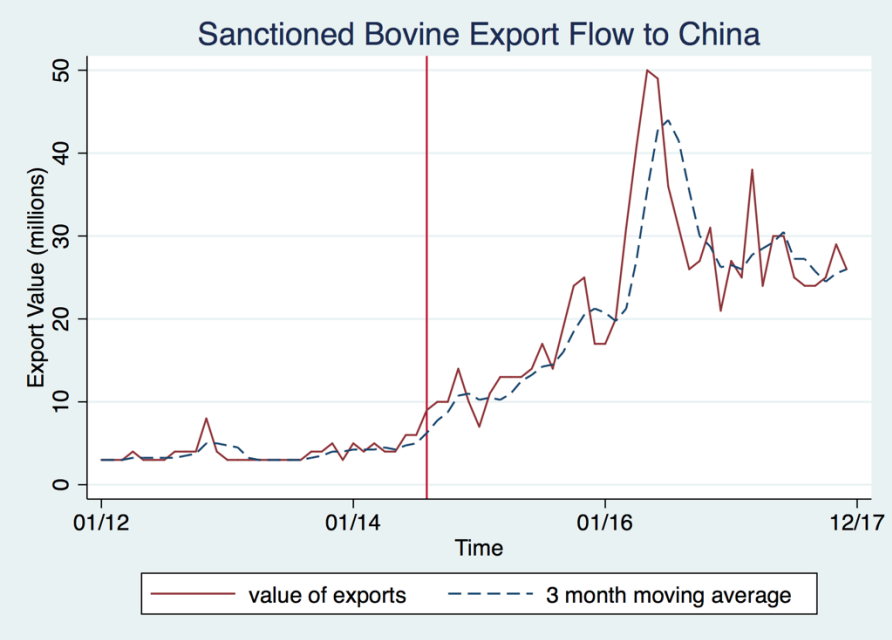

Figure 12: Development of Value Bovine Exports to China

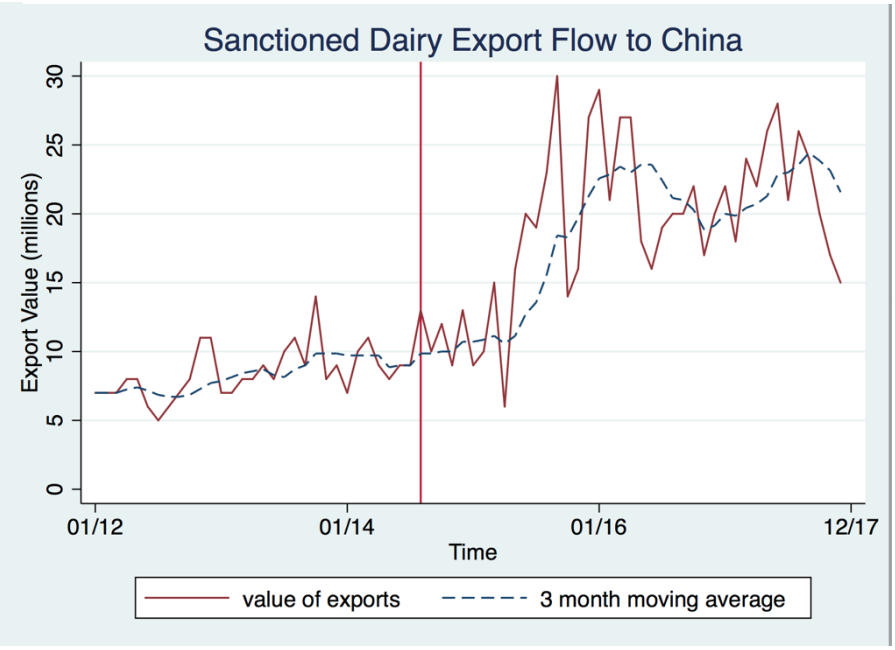

Figure 13: Development of Value Dairy Exports to China

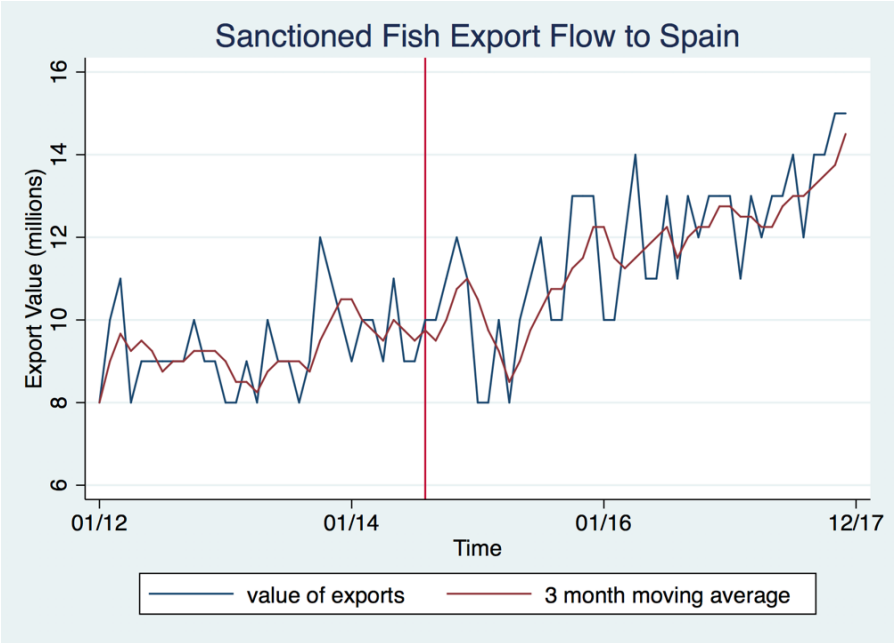

Figure 14: Development of Value Fish Exports to Spain

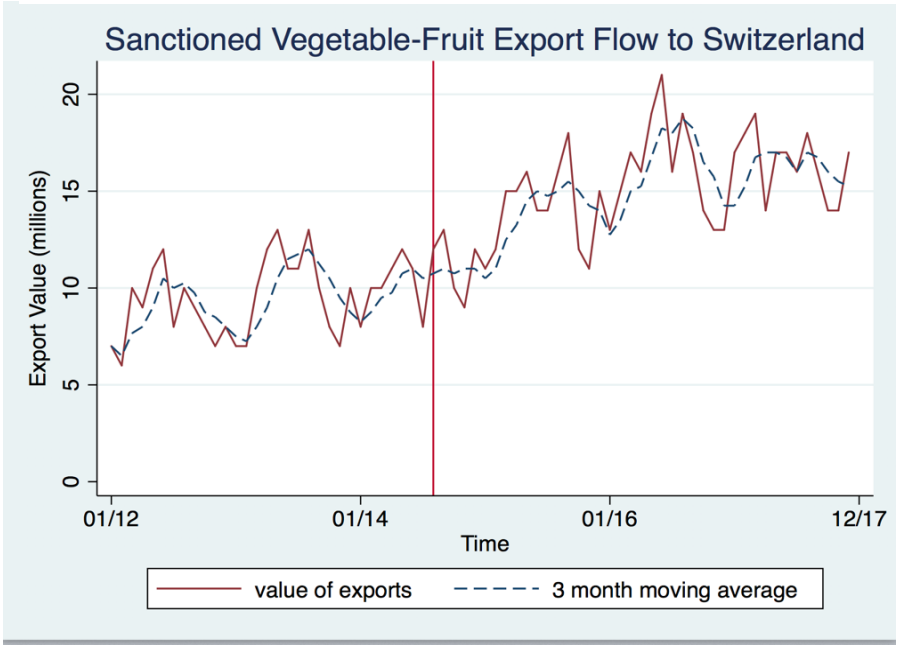

Figure 15: Development of Value Vegetable-Fruit Export to Switzerland