Russian Counter-sanctions and Trade Deflection: Evidence from Finland

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Abstract

Economic sanctions are a widely used, yet controversial international policy tool. This paper aims to examine the trade deflecting effects of Russian sent import sanctions on the Finnish exports. This effect is analyzed by estimating a gravity equation of trade by applying Pseudo-Poisson Maximum Likelihood and Ordinary Least Squares estimators. The data covers Finnish exports in the sanctioned product groups and a control group to 41 destinations from January 2013 to December 2016. A trade deflecting effect is found but the analysis fails to estimate the magnitude accurately.

Keywords: Sanctions, Trade Deflection, Trade Destruction, Gravity Model, Trade Policy

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Contents

1 Introduction

Economic sanctions are used for long time in cases where military interventions are not considered to be feasible. Notable crises in the 20th century where economic sanctions were imposed include the Italian-Abyssinian conflict, Rhodesian civil war, Cuban missile crisis and sanctions sent to the South African Apartheid government. Although economic sanctions are not a novel political instrument, the usage increased progressively in the 20th century and is strongly present in the current international politics as well. After the Second World War United States has been the largest individual sender of sanctions and after the end of Cold War also the United Nations Security Council has frequently used sanctions as a policy tool (Caruso, 2005).

In the emergence of the Russian annexation of the Crimean Peninsula, the West reacted by imposing series of economic and political sanctions on Russian companies and individuals. In response, Russia introduced its counter-sanctions on EU, US, Canada and others participating in the anti-Russian sanctions. By the presidential decree no. 778 on 7th of August in 2014 Russia imposed a ban on several agricultural products coming from the countries originally imposing sanctions on Russia (See Appendix A).

The essay contributes to the academic discussion of negative trade policies' effect on trade and the topic of sanction effectiveness by assessing the trade destructive and deflecting effects in the case of export sanctions. Sanctions are designed to harm or signal the target country, so trade destruction is a desired effect of sanctions. However, if the target of the sanctions can circumvent the sanctions by deflecting exports to other trading partners, the sanctions are more probable to be ineffective.

The aim of the essay is to first measure trade destruction of the Finnish exports and thereafter to assess whether trade was deflected or not. Trade destruction is measured by the drop in exports after the implementation of sanctions via a descriptive statistics approach. The trade deflection effect is assessed by difference-in-differences panel estimation of the gravity equation of trade. Considering theoretical framework and previous empirical research, trade deflection to other trading partners is expected to rise in case of increase in trade barrier between one partner, the sender of the sanctions in this case. The data covers Finnish exports to 41 destinations: EU countries, OECD countries and Russian Federation over the period January 2013 to December 2016.

The essay is structured as follows: Second chapter describes economic sanctions in general terms, and in the context of this essay and provides literature review of the factors contributing to sanction success. Third chapter covers the empirical strategy.

The fourth chapter is the data and descriptive statistics of the trade destruction and possible deflection. Fifth chapter covers the assessment of trade deflection effects through a panel estimation of the gravity equation complemented with robustness checks. Sixth chapter is the conclusions.

2 Economic Sanctions

Economic sanctions consists of a broad set of measures to achieve political or economic goals. Barber (1979) defines economic sanctions as economic measures directed to political objectives and adds that sanctions may be complemented with other measures of coercion, such as severance of diplomatic or cultural ties. Economic sanctions can be divided in three categories: boycotts, embargoes and financial sanctions (Caruso, 2003). In a boycott imposing country restricts the import of one or more goods from the target country or countries in order to lower the demand of the targeted products and therefore inflict economic damage. Embargo is the opposite of the first category, since there exports to target country are restricted completely or partially. Financial sanctions consist of restriction or suspension of lending and investing to the target country, preventing the investing of target country to the sender countries or freezing the target's foreign assets. The sanctions sent on Russia are a combination of all of these measures whereas the Russian counter-sanctions are narrower and only boycotting imports of the selected agricultural and food industry products. From EU's and its allies point of view these counter-sanctions are viewed as export sanctions.

According to Barber (1979) sanctions can be looked in three different ways: number of states involved, comprehensiveness and the authority behind the sanctions. These three dimensions span from unilateral to universal, selective to comprehensive, and recommendation to mandatory, respectively. The sanctions sent on Russia are multilateral, selective by nature, or "smart", since they are targeted at few critical sectors, such as energy and warfare, and supported with personal travel restrictions for selected Russian citizens. The sanctions are mandatory for businesses in countries that are committed to enforce the sanctions on Russia. The Russian counter-sanctions are unilaterally imposed, are selective, facing only few agricultural and food industries, and mandatory.

I will use "economic sanctions" and "sanctions" interchangeably. Additionally, I will refer to the imposer of the sanctions and to whom they are targeted as "the sender" and "the target", respectively. Also, when speaking of sanctions sent by Russian Federation (from now on, Russia), I will refer to them as "Russian counter-

sanctions" or "counter-sanctions".

2.1 Motivation behind Russian Counter-sanctions

The traditional motivation behind economic sanctions is based on the assumed relationship between economic activity and political behavior (Barber, 1979). Early example of this relationship was presented by Galtung (1967) as a simple causal relationship where economic punishment leads to economic turmoil, which leads to disintegration within the political leadership, which finally leads to compliance. In the later literature this simple causality is challenged. Pape (1997) criticizes this "causal logic of the theory of economic sanctions". The assumption of a straightforward relationship between economic sanctions and political behavior is a simple answer to why sanctions are so often imposed when unwanted political behavior is confronted, but there is no theoretical link between economic sanctions and the change of political behavior. Also Baldwin (1998) challenges this simplification and underlines that there is hardly, if at all, a consistent theory of such causal mechanism. Therefore, I will not make any claims of such theoretical links in this paper but refer to the empirical findings of the literature and use those as the framework and analyze against I will analyze my findings.

To better understand the motivation behind sanction imposing, Barber (1979) divides the objectives of economic sanctions in three categories: primary, secondary and tertiary objectives. Primary objectives relate to the actions and behavior of the target state. Secondary objectives relate to status, behavior and expectations of the sender state. Lastly, tertiary objectives relate to structure and operation of the international system as a whole.

Primary objectives are the ones that are publicly outspoken goals of the sanctions to affect the targets behavior. Although the primary objectives are often in line with the publicly announced objectives, sometimes the primary goal differs from the outspoken motive for sanctions. The import ban statement stated that the import ban of certain agriculture products is based on the concerns of food safety and food price increases caused by the import of foreign products. However, one could argue that the motivation is more to counter-act on the sanctions targeted on Russia (Veebel and Markus, 2015). From the perspective of international law Russia is violating Ukraine's territorial integrity but Russia consider interventions in other countries justifiable if it concerns defending a minority of Russian citizens, as was in the case of annexation of Crimean Peninsula. The primary goal of the Russian counter-sanctions is therefore to punish the EU and its allies for meddling with Russian politics (Veebel and Markus, 2015).

The secondary objectives of the sanctions are those that relate to the status of the sender. Barber (1979) stresses that they are as important as the primary ones. The secondary objectives are often motivated by the concerns that if no action is taken a loss of credibility among the sender state or states can occur and this loss of credibility can be costlier than the price of the sanctions (Klinova and Sidorova, 2016). In the Russian counter-sanctions the secondary objectives are motivated by the fear to been seen as weak under the western pressure and to reinforce the trust in the regime to act when Russian citizens are threatened. Khoklov and Sidorova (2015) also argue that Russia did not expect as harsh reaction from the western states as eventually emerged but instead believed that the economic interests would outweigh the political ones. In addition to the primary objective, to punish the western "aggressors", Russian leadership believed that they had to act in order to not appear weak in the eyes of their own citizens and the global community.

The tertiary objectives of are those which relate to wider international aspects. Barber (1979) described them as objectives that relate to the structure and function of the international system. For example in the Cuban crisis, stopping the spreading of communism was a tertiary objective for the U.S. (Barber, 1979). The Russian tertiary objective could arguably be to enforce the collaboration of the former soviet republics and to signal to the western countries that EU's expansion to the east, with the addition of its military collaboration, is not taken lightly.

To conclude, the motivation behind the Russian counter-sanctions were to punish the parties condemning the Russian actions as interfering with the Russian internal affairs.

2.2 Success of Economic Sanctions?

In addition to the political analysis of motivation behind sanctions, there is a broad literature concerning the success of economic sanctions. The famous work of Hufbauer et al. (1990) found that almost 30 percent of sanctions do lead to compliance. However, later research finds many of their results to be methodologically insufficient and that the number is likely to be exaggerated (Drury 1998; Dreger et al. 2015). The general consensus is that economic sanctions are not very successful when seeking policy change but that they sometimes still succeed. The determinants of the success are studied in numerous empirical studies, from which I will shortly discuss the most significant ones.

The traditional thinking that the determinant contributing most to the success of sanctions is their ability to cause costs high enough to the target. This argument is strongly backed by several studies (Lam 1990; Drury 1998; Lektzian and Souva

2007; Allen 2005). With more caution, Morgan and Schwebach (1997) argue that sanctions are not notably successful policy tools in general, but if the costs to the target are "extreme" the sanctions may lead to compliance. Few studies, such as Bonetti (1998) and Jing et al. (2003) also find the coefficients to be near zero [1]. In majority of studies the traditional thinking is still proven to bear truth so it is fairly safe to say that target cost is a robust determinant of sanction success.

Some researchers argue that multilaterally sent sanctions outperform unilaterally sent (Martin 1993; Allen 2008; Lektzian and Souva 2007). The intuition is that multilaterally sent sanctions are harder to circumvent and therefore more effective. However, others find no evidence for this claim and argue that multilateral coalitions are hard to maintain, hence they are not likely to succeed (Jing et al. 2003; Drezner 2000). The intuition is still not completely wrong and when controlling for the involvement of international organizations, multilateral sanctions are found to be more successful (Drury, 1998; Drezner, 2000; Bapat et al., 2013). International organizations can coordinate and give legitimacy for the sanctions which prevent the back-sliding of some hesitant senders, which can lead, according to Drezner (2000), to the collapse of the whole cooperation. Therefore, the involvement of an international organization is important if sanctions are sent multilaterally.

A number of other determinants are also argued to have effect on sanction success, but the research is mostly inconclusive in these. Some claim that sanctions sent towards an ally is the key to success, while others do not find proof for that [2]. Although costly sanctions are widely agreed to be more successful, some point out that even greater success is achieved when the costs are borne by the right people in the target state [3].

One reason for the inconclusiveness in the research of sanction success is the different definitions of sanction success but maybe the more significant is the different methodologies in the research. Bapat et al. (2013) cling to this issue by using 18 independent variables frequent in research of sanction success and running Bernoulli-logistic regression on every possible combination of these and then report the distributions of the coefficients and t-statistics for each of the variables. They find that only target costs and involvement of international organization are robust positive determinants of sanctions, and some such as target trade dependence are weakly robust.

To conclude, the literature is quite inconclusive on the expected effects of var-

[1] In both studies the coefficients are insignificant.

[2] Positive relationship: Lam (1990), Allen (2005). Insignificant: Drury (1998), Bapat et al. (2013). Negative relationship: Early (2011)

[3] see Lam (1990); Morgan and Schwebach (1996)

ious factors on sanctions but it is safe to say that target costs and involvement of international organization are considered to attribute most to success. However, when seeking compliance, one must to remember that despite these two factors increase the likelihood of success, economic sanctions are in general considered to be ineffective as policy tools.

3 Empirical approach

To assess trade destruction and deflection, as in earlier studies, first provide descriptive statistics of trade destruction and thereafter estimate a gravity equation to analyze if the destructed trade has deflected to other trading partners. If the sanctioned exports are deflected to Finland's other trading partners, the effect of the sanctions is arguably not as severe for Finland as the deflection mitigates losses.

I will follow the definition used by Bown and Crowley (2007) and Haidar (2017) of export deflection as a change in the destination of exports due to increase in a trade barrier in another market as when a rise in tariff on a export from country A to country B causes the the exports to be sold instead to country C. Export destruction is equally defined as a reduction in exports following an increase in trade barrier. Sanctions act equivalent to tariffs, and so as trade barriers, are expected to deflect trade to third countries and destruct exports to the sender.

Haidar (2017) found that the export sanctions sent on Iran led to first export destruction of the flows to sender countries but two thirds of the destructed flows were deflected to non-sanctioning countries. In addition, trade destructive and deflecting effect is studied through the analysis of other import-restricting trade policies such as duties and tariffs. For example, Bown and Crowley (2007) analyzed the effects of US anti-dumping duties on Japanese exports to third party countries and found that these duties lead to both trade destruction and deflection. Chandra (2017) found similar evidence from the temporary trade restrictions imposed on China by its trading partners: Chinese exports to countries imposing restrictions decreased around 35 % and when a restriction was imposed on other countries, the Chinese trade to the imposing country increased around 30 %. Sanctions are by definition trade restrictions, so by analogy they are ought to cause similar effects on the trade flows.

In this section I will present the gravity equation, issues related to its estimation and ways to overcome them, how sanctions enter the gravity equation and finally the specifications to assess the trade deflecting effects of sanctions.

3.1 Gravity Equation

In the gravity model of trade attraction is measured as trade flow between two partners, mass as the economic size of the partners, and distance as the business distance between the partners. In its application to international trade it says that countries trade in proportion to their GDP and distance. Simplified, large economies trade more and countries close to each other have larger bilateral trade compared

to countries far apart. In empirical literature, the GDP's and distance between partners are found to be the main determinants in explaining trade flows. Other factors unanimously agreed upon to have significant and robust effect on trade within the gravity model are common border, language, colonial history, to name few.

As an empirical model, the gravity model of trade is proved to be successful in economics and is extensively used to analyze various institutions' and policies' effects on trade flows (Anderson and van Wincoop, 2003). Anderson and van Wincoop (2003) stress that the early attempts to model trade flows with gravity equation have no theoretical basis and the first theoretical foundation to be given to the gravity model was by Anderson (1979). The assumptions Anderson (1979) made were product differentiation by place of origin (Armington assumption, Armington (1969)) and constant elasticity of substitution (CES) expenditures, and is therefore called the Armington-CES model. This model rose to popularity after Anderson and Wincoop (2003) influential paper giving a more concrete explanation and estimation method for the effects of trade costs[4].

The gravity equation presented by Anderson and van Wincoop (2003) explains trade flows from country i to country j as follows:

$$x_{ij} = \frac{y_i y_j}{y^w}(\frac{t_{ij}}{\Pi_i P_j})^{1-\sigma} \tag{1}$$

where

$$\Pi_i = (\sum_i (t_{ij}/P_j)^{1-\sigma}\theta_j)^{1/(1-\sigma)} \tag{2}$$

$$P_j = (\sum_i (t_{ij}/\Pi_i)^{1-\sigma}\theta_i)^{1/(1-\sigma)} \tag{3}$$

In the above equations Π_i and P_j are called the "multilateral resistance" terms (MLR), and are part of the trade cost term, $(\frac{t_{ij}}{\Pi_i P_j})^{1-\sigma}$. The first, Π_i, is the outward MLR's and measures importer j's ease of market access. Similarly, P_j is defined as the inward MLR's and measures exporter i's ease of market access. The bilateral trade cost between partners i and j, t_{ij}, is approximated by various geographic and trade policy variables. There is various ways for controlling for the multilateral trade resistances but it has to be done indirectly, since they are theoretical constructs.

The effect on bilateral trade between i and j is affected by the MLR's in a fairly intuitive way: the larger the MLR of exporter i are with its all trading partners, the smaller the relative bilateral resistance is with the importer j. In other words,

[4]According to Arkolakis et al. (2013) multiple models with different micro-foundations (such as Heckscher-Ohlin and Ricardian frameworks, and sectoral Armington model) have been used to derive the gravity equation capturing the trade gains equally to the Anderson and van Wincoop (2003) Armington-CES model.

the relative price is cheaper with two trading partners when there is a multilateral barrier with all other trading partners, after controlling for size with $\frac{y_i y_j}{y^w}$.

A practical feature of the structural model of gravity theory is that it is separable so that bilateral expenditures are separable from output and expenditure at the country level (Anderson and van Wincoop, 2004; Anderson and Yotov, 2008; Larch and Yotov, 2016b). That makes the model applicable to analyzing the trade on sectoral levels, which is often valuable since different product groups may be affected differently under a trade policy. Anderson and van Wincoop (2004) augmented their original structural gravity equation with country-level output, y_i^k, and expenditure, y_j^k, where k is the class of goods. The sectoral gravity equation is as follows:

$$x_{ij}^k = \frac{y_i^k y_j^k}{y^k} (\frac{t_{ij}^k}{\Pi_i^k P_j^k})^{1-\sigma_k} \tag{4}$$

The key differences in the sectoral gravity equation is that the multilateral resistances and that the trade costs, t_{ij}^k, are sector-specific as well.

3.2 Sanctions and Gravity Equation

Sanctions enter the gravity equation as trade costs when analyzing the effects of those said sanctions. The unobservable trade cost factor, t_{ij}, or bilateral trade resistance with sanctions included is modeled as

$$t_{ij}^k = b_{ij} d_{ij}^\rho \tag{5}$$

so that t_{ij} is a log-linear function of observables, bilateral distance d_{ij}, and variable b_{ij} which takes value 1 if i and j are located in the same country, and 1 plus tariff equivalent otherwise. Other variables have been found to be significant coefficients as explaining the trade costs, such as common language and former colonial relationship. The question of interest here is how the sanctions enter the trade cost factor. As previously explained, the multilateral resistances affect the relative prices. I write again the outward multilateral resistance to show how sanctions affect the relative prices and therefore lead to either trade destruction or deflection

$$\Pi_i = (\sum_i (t_{ij}/P_j)^{1-\sigma} \theta_i)^{1/(1-\sigma)} \tag{6}$$

Sanctions cause trade destruction if exports from i to j decrease due to the increase in trade costs, t_{ij}^k. Trade deflection is similarly caused by the increase in t_{ij}^k due to the increase in Π_i^k. When the multilateral resistance with country j increases, the relative MLR with all other trading partners decrease. Hence, sanctions effects' work through affecting these relative prices. The following example sheds light on

the mechanism. When sanctions are imposed on the selected product groups the trade flows to the sender of these products dries up. This means that the trade with other countries becomes relatively cheaper, since the sanctions increases the bilateral resistance between the sender and the target and therefore decrease the multilateral resistance towards all other trading partners. Hence, sanctions should deflect trade from the target country to its other trading partners when sanctions are imposed on a country, since the trade barrier increases between the sender and target.

3.3 Issues regarding Gravity Equation estimation

As previously explained, multilateral resistances are vital to provide theory consistent estimates of trade effects when estimating the gravity equation. Anderson and van Wincoop (2003) originally use non-linear least squares (NLS) method to obtain estimates for MLR terms when estimating the structural form of gravity model. The NLS method is computationally challenging, so various other methods are used to approximate the MLR's. Several researchers use a reduced form of the structural gravity equation and approximate the MLR terms with "remoteness index", constructed as a function of bilateral distances and GDP's and estimated with ordinary least squares (e.g. Baier and Bergstrand, 2009). Hovewer, this approach is criticized by Anderson and van Wincoop (2003), since estimations with MLR and remoteness index gives significantly different results. Olivero and Yotov (2012) show that by controlling for the MLR terms with exporter and importer fixed effects in cross-section studies and exporter-time and importer-time fixed effects in panel studies gives results that are consistent with the Anderson and van Wincoop (2003) results. In addition, to account for the MLR's, the usage of exporter-time and importer-time fixed effects also absorbs the size (GDP) variables from the structural gravity model as well as all other observable and unobservable country- and time-specific characteristics. Hence, the traditional gravity variables are omitted from the estimation when using fixed effects.

To achieve unbiased estimators, the most appropriate method is to estimate the reduced form of the structural gravity equation with the importer- and exporter-time fixed effects with Pseudo Poisson Maximum-Likelihood (PPML) estimator (Faully, 2015). However, due to convergence issues when estimating using the PPML regressor, I use destination-product fixed effects and time fixed effects separately. This leads to somewhat different result, since time-varying variables such as GDP are not absorbed by the fixed effects. Therefore, I will also estimate the gravity equation with OLS with the recommended importer- and exporter-time fixed effects

for robustness comparison, in addition to using the same FE's than in the PPML estimation.

Another issue with trade data estimation is the often frequent zero observations in one or multiple country pairs in some point or points in the sample period. This occurrence of zero trade flows increases when dealing with disaggregated data, sectoral or regional for example, since the more specific and smaller in size the units are the larger the possibility that there is no trade in the group or that the flows are not measured (Anderson, 2010). Traditional method of estimating gravity equations logarithmic transformation with OLS is problematic in the presence of zero trade flows, since the transformation drops the zeros off the data. There are multiple methods to handle data in presence of zero trade flows, such as substituting zero trade flows with a small value (such as 1), Tobit estimation (see Eaton and Tamura, 1995; Martin and Pham, 2008), two-stage selection process (see Helpman et al., 2008) and PPML estimation of the gravity equation in its multiplicative form as shown by Santos Silva and Tenreyro (2006). Although the occurrence of zero trade flows is not large in the dataset, while some 15 % of the observed trade flows are zero, it is good to account for. First, I will estimate the gravity equation with PPML where the zero trade flows are included as they are. Thereafter I replace the zero trade flows with 1 and run OLS estimations of the log-linearized specification. For robustness check I also run OLS where the zero trade flows are excluded.

Third issue with trade data is the presence of heteroscedasticity, so that OLS estimation gives biased and inefficient estimates (Santos Silva and Tenreyro, 2006). This problem can be overcome by estimating the gravity equation so that the dependent variable, that is trade, is size-adjusted as in Anderson and van Wincoop (2003) and using NLS estimation or by applying the PPML estimator to estimate the gravity equation as proposed by Santos Silva and Tenreyro (2006). From these two approaches the latter is preferable, since, as previously explained, it can account for the zero trade flows, is usable with fixed effects and requires less computational powers than the NLS method. Thereafter I compare the results with the various OLS estimation results.

3.4 Model specification for Trade Deflection

The specification I estimate with PPML estimator is the following:

$$Exports_{ijpt} = exp(\beta_1 + \beta_2 lnGDP_j + \beta_3 DID + \mu_{jp} + \lambda_t)\epsilon_j \tag{7}$$

where i denotes Finland, j denotes the partner, p is the product class, that is sanctioned or not, and t is the month where the exports are measured. DID is the

interaction between the sanction dummy and the post-sanction dummy, $Sanction \times Post$, and its coefficient β_3 is the one of main interest in the estimation. The destination-product fixed effects are denoted by μ_{jp} and the time-fixed effects by λ_t. The last term, ϵ_j, denotes the errors. The standard errors are clustered on the partner level because I am concerned that the products export behavior is correlated in the same destinations.

Destination-product fixed effects controls for time-invariant aspects on the destination-product level. In addition these effects control for traditional gravity variables such as distance, common border, common language etcetera, which are therefore excluded from the specification[5]. Time-fixed effects control for everything that varies over time, such as trends in export flows, GDP and population.

After controlling for all time-variant and -invariant aspects with fixed effects, the variable left is the predictor of interest, DID, that is the difference-in-differences coefficient. It shows if the expected mean change in outcome from before the sanctions to post sanction introduction was different in the control and treatment group. If positive, it is evidence of trade deflection.

In addition to the PPML estimation, I will run four different OLS estimations. The difference in the specification is that the dependent variable, exports, is in logarithms:

$$lnExports_{ijpt} = \beta_1 + \beta_2 lnGDP_j + \beta_3 DID + \mu_{jp} + \lambda_t + \epsilon_{jt} \tag{8}$$

The first two estimations include the same clustering of standard errors as the PPML, that is on partner level and in the latter two the errors are clustered on partner-time level. This is due concerns that the errors are not only correlated in the same destinations but specifically in destination-time pairs. With both types of clustering, one OLS regression is run with zero trade included and the other with zero trade excluded.

[5]These variables would be perfectly collinear with the fixed effects dummies.

4 Data and descriptive statistics

4.1 Data sources and construction of the panel

The data covers Finnish exports to 41 destinations: EU countries, OECD countries and Russian Federation over the period January 2013 to December 2016. Figures are obtained from the Finnish customs statistical database. The data is in four-dimensional panel format. The dimensions are reporter (i), partner (j), product class (k) and time (t). Reporter is Finland in all 3936 observations. Product class is either *sanctioned* or *non-sanctioned*. The dependent variable is $Exports_{ijpt}$, that is sanctioned or non-sanctioned trade from Finland to its trading partner j in month t measured in current euros.

Table 1: Variables

Variables	**Definition**	**Unit**
Exports	Value of exports to destination j in time t	Thousand euro
GDP	GDP in destination j	Thousand euro
Treatment	Dummy variable taking value 1 if the product class is sanctioned	Dummy (0/1)
Post	Dummy variable taking value 1 if month is after the sanction imposing	Dummy (0/1)
DID	The interaction dummy variable of Treatment and Post	Dummy (0/1)

Treatment is a dummy-variable taking value 1 if the export flows consist of sanctioned product groups and zero otherwise, working as the nominator of treatment and control group, respectively. The treatment group of sanctioned flows is aggregated from the industry specific sanctioned export flows at CN4 level based on the Russian decree imposing the sanctions[6]. The control group of non-sanctioned products is compiled from the CN4 groups including the sanctioned products as well from where the sanctioned flows are subtracted. I believe this approach to generate the control group is reasonable from two reasons. First, the control group consist of products that are similar to the sanctioned ones so that they can be expected to have similar export trends. Second, the export flows of the treatment and control group are approximately equally sized so there is less probability for scaling

[6]Combined nomenclature (CN) system is a product classification system created on the basis of Harmonized System (HS) by the European Commission (see Council Regulation (EEC) No 2658/87).

problems when estimating the gravity equation[7].

Table 2: Export destinations

Australia*	Denmark*	Israel	Netherlands*	Slovenia*
Austria*	Estonia*	Italy*	New Zealand	South Korea
Belgium*	France*	Japan	Norway*	Spain*
Bulgaria*	Germany*	Latvia*	Poland*	Sweden*
Canada*	Greece*	Lithuania*	Portugal*	Switzerland
Chile	Hungary*	Luxembourg*	Romania*	Turkey
Croatia*	Iceland*	Malta*	Russia	United Kingdom*
Cyprus*	Ireland*	Mexico	Slovakia*	United States*
Czech Republic*				

*Facing counter-sanctions

I followed the official list of sanctioned products (see Appendix 1) as precisely as possible, although there are some differences in the data and actual flows. First, all dairy products except lactose-free products are banned from imports. However, lactose-free products are not separately specified in the CN-system so they remained in the sanctioned flows. Second, the official list includes some products in 10-digit level when the Finnish customs measures flows up to 8-digit level. These product groups are not separately specified in the data but included as their 8-digit level super-group. These also explain why the sanctioned export flows are not exactly zero as seen from the graphs following section.

The trade flows of each sanctioned CN6-class are aggregated to form a group called "sanctioned" and the control group, called "non-sanctioned", is compiled from the CN4-product groups which include the sanctioned product groups. The aggregated amount of the sanctioned trade flows are then subtracted from the non-sanctioned trade flows to generate an appropriate control group for the use of difference-in-differences estimation. The choice of control group is chosen as the trade of similar product groups can be predicted to behave similarly than the trade in sanctioned product groups. The panel data is constructed to satisfy exporter-partner-time-product group dimensions, where the trade flows are observed on monthly basis stretching from January 2013 to December 2016. As mentioned in the first chapter, the Russian counter-sanctions were imposed on August 2014, so the trade to Russia after that time-period are expected to take values of zero.

GDP figures for the partners are obtained from Eurostat. The figures are at

[7]The mean of treatment and control group is approx 990 000 euros and approx 2 290 000 euros, respectively.

quarterly frequency and measured in current euros. Figures for 2013 to 2015 are actual and for 2016 estimates. Eurostat lacks the figures for United States, Canada and Chile, so these are excluded from the data set[8]. When running the estimations, these countries are dropped.

4.2 Descriptive statistics of trade destruction and deflection

I will start by graphical analysis to search if there is a trade destructive effect and if there is, move to analyzing if the trade deflected.

The export destructing effect of the sanctions is observable from figure 1, where the period where the sanctions were imposed is marked with a vertical line. The exports of the sanctioned product groups dries up almost immediately after the Russian ban on selected foodstuff categories is imposed[9]. The drop is almost 99 % between the periods before and after the counter-sanctions. This drop could be explained by the sanctions, since exporting was not possible after the implementation of these import restrictions.

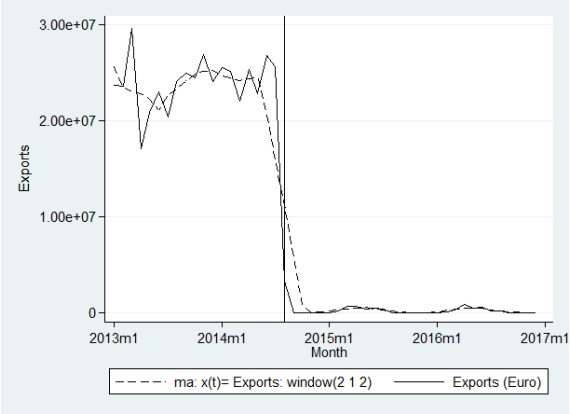

Figure 1: Sanctioned exports to Russia in the sample period

What is surprising, is the simultaneous drop in the exports of the control group as well, as seen in Figure 2. The drop is around 68 %, which is a substantial amount and cannot be explained by the sanctions. The drop in the control group may be explained by the coinciding collapse of ruble and the drop in crude oil prices, which led to Russian financial crisis[10]. Other studies suggest likewise that the overall decline in exports to Russia is caused in major parts by the decline in Russian

[8]These values were not retrievable as current dollars or euros from national sources, either.

[9]Note that the exports that are still observable in the graph are those of the exempted sub-categories, that is lactose free products and foodstuff used in the production of baby food.

[10]See Dreger et al. (2016) for more information on the effects of exchange rate fluctuation and decrease in oil prices on Russian exports and imports.

purchase power (Berg-Andersson and Kotilainen, 2016; Crozet and Hintz, 2016).

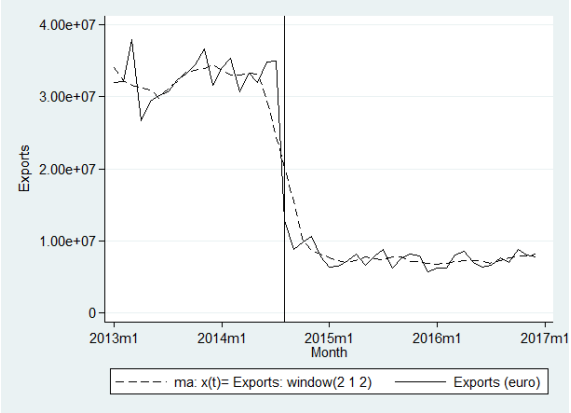

Figure 2: Non-sanctioned exports to Russia in the sample period

The sudden drop of exports in the sanctioned product groups suggests that there was a trade destructive effect caused by the sanctions. Since there was a simultaneous and substantial drop in the control group as well, there were other forces affecting the decline in trade in addition to the sanctions. However, there is still a significant relative difference between the sanctioned and non-sanctioned product groups. This points to the direction that sanctions contributed to the destruction of exports.

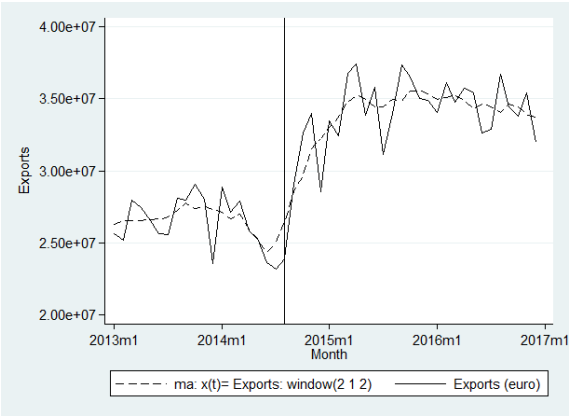

Figure 3: Sanctioned exports to other trading partners in the sample period

As explained in Chapter 3, sanctions act as export barriers and it is expected that they deflect trade from the target to other partners when the flows to the sender are destructed. Now, when looking at the export trends to other trading partners before and after the implementation of the sanctions, there is a clear increase in both groups but more pronounced in the exports of sanctioned products. This can be seen from figures 3. and 4. The increase in the average exports between periods before and after sanctions, in the sanction and control group was around 67% and

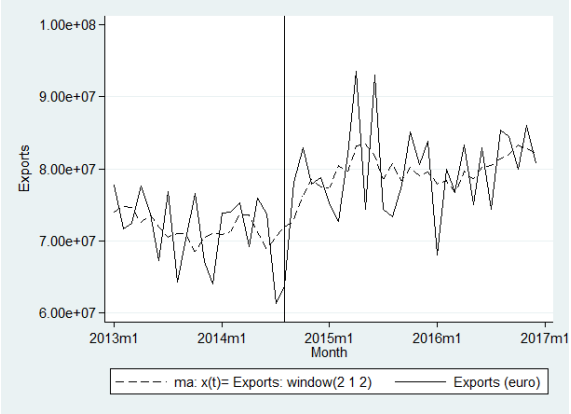

Figure 4: Non-sanctioned exports to other trading partners in the sample period

44 %, respectively. This suggests that the sanctions have indeed a trade deflecting effect in addition to other factors that also led to the increase in control group.

In the light of the descriptive analysis, trade destruction seems to be caused to some extent by the sanctions but because of the coinciding Russian financial crisis the magnitude of destruction cannot be surely quantified. Trade deflection in the sanctioned product groups was more pronounced compared to the control group and to further investigate this relationship I will move to econometric analysis of trade deflection.

5 Trade deflection

To estimate the export deflection in the sanctioned product groups, I ran difference-in-differences estimations with different specifications to see how the sanctioned product groups were affected after the sanctions were imposed compared to the control group. This approach enables the identification of the counter-sanctions' effect on the rise in exports in the sanctioned products groups while controlling for other possible factors affecting the increase in export flows to other trade partners. The results of the main estimation are presented in *Column 1* in *Table 3*[11].

DID, the coefficient of interest, is the difference in exports of non-sanctioned products before the sanctions versus after the introduction minus the difference in exports in sanctioned products before the sanctions versus after the introduction of the sanctions. The coefficient is positive in all of the estimations, as can be seen from the the columns (1)-(5) in *Table 3*. The main estimation, PPML, in the column (1) is of expected sign, although not significant. However, with z-statistics of 1.56, the coefficient is near to reach significance at the 10 % level.

Columns (2)-(5) present the results of the different OLS regressions. Columns (2) and (4) shows the results from OLS where the standard errors are clustered on the partner-time level, while the latter excludes observations with zero trade flows. Columns (3) and (5) show results where standard errors are clustered on partner level, and accordingly, the latter excludes zero flows.

The magnitude of trade deflection in the different estimations vary a lot. In columns (2) and (3) the elasticity for DID is 0.774 in both which gives a a value of around 117 %[12]. In columns (4) and (5), where the zeros flows are excluded, the value for trade deflection is more modest, around 33 %. All of the OLS estimations are significant, but the most robust results are obtained when clustering the standard errors at the partner-time level, which is not surprising when recalling that it is probable that the errors are correlated on destination-time level. The near-significant coefficient from the PPML estimation gives value of around 16 % for trade deflection. The significance level of the PPML estimation could possibly be better if the clustering or robust standard errors would have been possible at the partner-time level.

The difference in the coefficients could be explained by PPML's better capability to deal with heteroscedasticity and zero trade flows in the data compared to OLS.

[11]Exports to Russia are excluded from the regression, since the goal is to measure how the sanctions deflect trade to other trading partners.

[12]Since the specification is estimated in original multiplicative form, the coefficient needs to be transformed to obtain the percentage value $(e^{\beta} - 1) \times 100$.

Santos Silva and Tenreyro (2006) found similar upward bias in the OLS in their estimation comparisons. The OLS with zero trade flows included as ln(Exports+1) compared OLS with ln(Exports) are in similar way upward biased as in the original simulation. They argue that PPML gives a less biased and more theory consistent results.

Table 3: Regression table

	(1) PPML x_{ijt}	(2) OLS $ln(x_{ijt}+1)$	(3) OLS $ln(x_{ijt}+1)$	(4) OLS $ln(x_{ijt})$	(5) OLS $ln(x_{ijt})$
lnGDPj	0.0915	1.513*	1.513	1.286	1.286**
	(0.552)	(0.763)	(1.250)	(0.768)	(0.408)
DID	0.147	0.774***	0.774**	0.287***	0.287*
	(0.0978)	(0.138)	(0.269)	(0.0791)	(0.135)
D-P FE's	Yes	Yes	Yes	Yes	Yes
Month FE's	Yes	Yes	Yes	Yes	Yes
Zero trade	Yes	Yes	Yes	No	No
SE clustering	Partner	Partner-time	Partner	Partner-time	Partner
Observations	3450	3546	3546	3012	3012
Adjusted R^2		0.040	0.040	0.037	0.037

Robust standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The findings are still in line with the expected outcome: Russian counter-sanctions have had a trade deflecting effect to other trading partners of Finland. The magnitude of the effect is however somewhat a question mark. When comparing the results of the different specifications, the effect is somewhere between the results of the PPML and OLS with zero trade flows included, but more probably closer to the PPML estimations coefficient, because OLS tends to give biased results and from the fact that 117 % trade deflection estimation given by the OLS is most definitely an exaggerated number.

5.1 Robustness and limitations

In addition to the PPML and OLS estimations, I ran two OLS regressions with theory consistent importer-time fixed effects suggested by Faully (2015) for robustness check, again one with clustering on the partner-time level and another on the partner level.

Table 4: Robustness check with exporter-time FE's

	(1)	(2)
	OLS	OLS
DID	0.706***	0.706
	(0.189)	(0.359)
Destination-time FE's	Yes	Yes
SE clustering	Partner-time	Partner
Observations	3840	3840
Adjusted R^2	0.216	0.216

Robust standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results in column (1) of table 5 propose that 101% of the sanctioned exports would have deflected. This number does not vary excessively from the OLS results with separate destination-product and time fixed effects, but is also likely to be exaggerated. However, it brings the estimation closer to PPML estimation. Again, the previous empirical evidence and simulations suggest that the trade deflection due to sanctions is likely to be closer the PPML estimations results than the OLS results.

I would also like to address some limitations of my empirical analysis of trade deflection. First, the sample of partners include lot of countries that are facing the sanctions as well. This could arguably affect make it harder for Finnish producers to enter these markets, when these markets suffer of oversupply of the sudden faced sanctions, hence there is less probability that the exports would deflect to these countries. By adding more countries to the data set, a more accurate estimation of the trade deflection could be possible. However, since the selected trading partners include all the major trading partners of Finland, the data includes the major portion of trade in the sanctioned product and control group.

Second, intra-national trade is not accounted for in this study. When analyzing policy effects, some scholars advise to use intra-national data, because it is consistent with the theory (Dai et al., 2015) and decreases biases in the estimation of trade policies (Bergstrand et al., 2015). Since the Finnish intra-national trade is not included in the estimation, it is impossible to account for possible deflection of trade to the domestic markets. This might lead to upward bias in the estimated effect of trade deflection to other countries.

6 Conclusions

The aim of this essay is to assess, first the trade destructive and, second, deflecting effects of Russian sanctions on Finnish exports of the sanctioned product groups to compared to non-sanctioned product groups. A tertiary aim is to comment if the sanctions are effective. The data set covers period from January 2013 to December 2016.

The empirical results show that exports to Russia in the sanctioned product groups as well as in the control group decreased after the sanctions were imposed, hence trade destruction was evident in the light of the descriptive part of the essay. There is little surprise in this result, since sanctions were designed to restrict imports to Russia and are relatively easy to enforce by border control. The trade to Russia decreased to almost zero in the sanctioned product groups. The results of the difference-in-difference estimation of the gravity model on the trade deflection effects support the theory of trade deflection in case of increase in trade barrier. This is in line with previous research of trade deflection in the case of sanctions and other measures of trade restrictions. Due to insignificance in the benchmark PPML estimation, it is unreliable to accurately measure the magnitude of the trade deflection. However, the robust OLS estimations support the existence of export deflection, although the effect of sanctions is likely to be exaggerated.

As the primary objective of the Russian counter-sanctions is to punish the countries imposing sanctions on Russia, I comment this success in the context of Finland. The evidence of deflection of the destructed trade suggests that the trade sanctions sent by Russia are not as effective as purposed. When recalling that one of the most important characteristics of successful sanctions are the ability to inflict damage to the target, the sanctions cannot be seen as successful against that measure. This outcome contributes to the strong consensus in the empirical literature that sanctions are relatively ineffective as international policy tools. However, as the implementation of economic sanctions seems to only increase in the international politics, further research of the trade disruptive effects of sanctions should be conducted to better understand why sanctions are sent.

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A Unofficial translation of decree no. 778

Unofficial translation

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"

Pursuant to the Decree of the President of the Russian Federation on August 6, 2014 № 560 "On the application of certain special economic measures to ensure the security of the Russian Federation", the Government of the Russian Federation decrees as follows:

1. To introduce for one year a ban on imports into the Russian Federation of agricultural products, raw materials and food, originating from the United States, the countries of the European Union, Canada, Australia and the Kingdom of Norway, in line with the annexed list.
2. The Federal Customs Service to ensure control over the implementation of Item 1 of this Resolution.
3. The Governmental Commission on Monitoring and Rapid Response to changing conditions on food markets together with the high executive authorities of the subjects of the Russian Federation to ensure a balance of commodity markets and to prevent the acceleration of growth in prices of agricultural products, raw materials and foodstuffs.
4. The Ministry of Industry and Trade of the Russian Federation and the Ministry of Agriculture of the Russian Federation together with the high executive bodies of the subjects of the Russian Federation to organize the implementation of the daily operational monitoring and control over the state of the markets of agricultural products, raw materials and food
5. The Ministry of Agriculture of the Russian Federation together with interested federal executive authorities and with participation of associations of producers of agricultural products, raw materials and food to develop and implement a set of measures aimed at increasing the supply of agricultural products, raw materials and food in order to prevent a rise in prices
6. The Ministry of Industry and Trade of the Russian Federation, the Ministry of Agriculture of the Russian Federation, the Ministry of Economic Development of the Russian Federation and the Federal Antimonopoly Service with participation of retail chains and trade organizations to ensure the coordination of activities in order to curb rising prices.
7. This Decision shall enter into force on the day of its official publication.

D.Medvedev

Chair of the Government

Of the Russian Federation

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
0301, 0302, 0303, 0304, 0305, 0306, 0307, 0308	Fish and crustaceans, molluscs and other aquatic invertebrates
0401, 0402, 0403, 0404, 0405, 0406	Milk and dairy products
0701, 0702 00 000, 0703, 0704, 0705, 0706, 0707 00, 0708, 0709, 0710, 0711, 0712, 0713, 0714	Vegetables, edible roots and tubers
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
1901 90 110 0, 1901 90 910 0	Finished products, including cheese and curd(cottage cheese) based on vegetable fats
2106 90 920 0, 2106 90 980 4, 2106 90 980 5, 2106 90 980 9	Foods (milk containing products on the basis of vegetable fats)

* 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.

B Data sources

Data	Source	URL
Finnish monthly exports	Finnish customs statistical database	http://uljas.tulli.fi/
GDP's	Eurostat	http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=naidq_10_gdp&lang=en