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## Shooting Down Trade: The Impact of Russian Sanctions on Turkish Exports and Exporters

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## Abstract

On 24 November 2015, Turkish military shot down a Russian fighter jet near the Syrian-Turkey border as it violated Turkish airspace for about 16 seconds. Russia retaliated by imposing an embargo on 17 agricultural HS-6 level products from Turkey. This paper evaluates the impact of these sanctions on Turkish exports and firms. Using restrictive customs and firm-level data, we estimate the effect of these sanctions on the exports towards Russia, for embargoed and non-embargoed products. We estimate a total trade loss of USD 5.8bn for Turkish exports, 84% of which stemming from non-embargoed products. Moreover, the adverse effects of sanctions persisted for some products even after these sanctions were lifted. Our firm-level analysis shows that firms trading with Russia directed part of their exports to other foreign markets and to the Turkish domestic market.

JEL: F13, F14, F51

Keywords: embargo, sanctions, international trade

## 1. Introduction

In the morning of 24 November 2015, a Russian Sukhoi Su-21 fighter entered 2.19 kilometres inside the Turkish border, violating Turkish airspace for 17 seconds. After multiple warnings, the Russian jet was showdown by a Turkish Air Force F-16 fighter. A few days later, Russia retaliated by imposing an embargo on several agricultural products, raw materials and food products, from Turkey that would be effective within a month and last 18 months.

Countries have long used economic sanctions as a foreign policy tool to respond to such events to impose costs on their adversaries and induce behavioural changes. Sanctions can take many forms including economic and trade restrictions, restrictions on bank activities and financial operations, travel bans and arms embargos. Recent examples include sanctions imposed on Iran, North Korea, or Russia. Given the frequent use of such tools, it is crucial to have an assessment of the magnitude of economic costs and the channels through which sanctions may operate.

In this paper, we assess the consequences of trade sanctions imposed by the Russian Federation on Turkish exports and firms. The sanctions episode lasted 22 months and provided an excellent case study for two reasons. First, the unexpected nature and the swiftness of Russia's response created a natural experiment which allows identification of the short-term effects of such sanctions. Differently than for instance, Western sanctions on Russia that were implemented gradually over time, these sanctions were sudden and unexpected. Secondly, Russia's response was limited mainly to an embargo on specific products and was not accompanied by other sanctions such as bans on financial institutions, as in Iran in Russia, which may impair a country's trade capacity through other channels. The focus of sanctions on specific products allows us to estimate the loss of exports driven by the trade embargo, and assess the efficiency of such measures. Thirdly, instead of lifting these sanctions at the same for all products, Unlike other sanction episodes, Russian government lifted them overtime for different products. This provides the opportunity to study the effectiveness of sanctions over time but the heterogenous effects by product type.

We analyse the impact of sanctions on Turkish exports in two steps. First, we build an empirical model of Turkish bilateral trade flows in embargoed and non-embargoed goods with Russia and non-sanctioning other countries. Using administrative monthly customs data covering total universe of exporters from Turkey, we employ a difference-in-differences methodology to estimate changes in export values from Turkey to Russia due to sanctions and also to other countries. This estimation strategy allows us to compare the impacts of the embargo along with the interaction of three margins: embargoed versus non-embargoed goods exports to Russia, overall exports to Russia and non-sanctioning countries, and the pre-embargo and post-embargo periods.

Our findings indicate that the embargo was fully effective in shutting down the exports from Turkey on the sanctioned products. We find that exports of sanctioned products dropped by almost 99%, generating a loss of \$965.8m. Moreover, we find that even after these sanctions were lifted effects persisted for some products, suggesting damages to bilateral trade relationships that last beyond the sanction period.

The embargo impacted the overall bilateral trade with Russia. We find evidence for an unexpected spillover effect of the embargo on overall Turkish exports to Russia. After the imposition of the embargo, the average Turkish export flows of non-embargoed goods to Russia declined by about USD2.6bn or by 70%. Although the chilling effects weakened over time, overall trade had fallen to 59% of the lost embargo period.

In the second part of the analysis, we drill further down and focus on the effects of sanctions at firm dimension using administrative firm-level data. Using a triple difference strategy (at product, partner and sanction period), we show that all firms that trade with Russia see their overall exports decrease due to the direct effect of sanctions and spillover effect stemming from non-embargoed exports to Russia. We also find that these firms partly compensated part of their loss of exports by diverting their trade other countries. These effects are especially significant for firms trading sanctioned products.

This paper is related to the literature on the effectiveness of trade policies such as economic sanctions, embargoes, and boycotts. Eaton and Engers (1999) and Kaempfer and Lowenberg (1988) establish a theoretical framework to study sanctions and their effectiveness, while empirical studies such as Hufbauer, Schott, and Elliott (2009) or Bapat et al. (2013) have tested their whether such sanctions have been successful or not. In general, sanctions are rarely effective, and the effectiveness of the sanctions depends on the market power of the participants. Irwin (2005) and Coulibaly (2009) study the effects of the Jeffersonian embargo on Cuba and South African, respectively. Michaels and Zhi (2010) show that the diplomatic clash between France and United States over the Iraq War in 2003 reduced bilateral trade by about 9% during a short period. Focusing on the same period, Pandya and Venkatesan (2016) exploit scanner data to show that the sale of French-sounding products declined in U.S. supermarkets.

Our paper is closely related to recent work on the impact of trade sanctions on bilateral trade and exporting firms. Haidar (2017) investigates the impact of Western-imposed sanctions on exports of Iranian firms and show that Iranian exports destroyed by sanctions were deflected to non-sanctioning countries. Miromanova (2019) focus on the Western-imposed sanctions on Russia using bilateral trade data and finds that sanctions were not fully effective and only generated a drop in the trade of sanctioned goods by half. Moreover, while exporters diverted their trade to other countries, other products were impacted generating spillovers. Crozet and Hinz (2017) focus on the trade loss effects of trade sanctions from the perspective of the sending country during the Russian embargo. Using French firm-level export data, they show that the bulk of the negative impact stems from products that are not directly targeted by the sanctions.

This paper contributes to the literature in international trade sanctions and their impact on exports and exporters in several ways. First, to the best of our knowledge, it is the first study that uses a natural experiment as a source of identification to causally estimate the effect of product embargo on the exports of sanctioned countries. Differently than the literature that has analyzed the effects of multiple sets of sanctions that were imposed at the same time, our paper covers a single sanction tool, applied in an exogenous setting. Second, by focusing on bilateral sanctions, it provides a different setting than most of the other papers where multiple countries would be sanctioning a single country. This could be important as, having a broader set of countries towards which sanctioned country (i.e. Turkey), can export to, may undermine the effects of the embargo. Third, we contribute to the literature studying the effects of sanctions

on firm-level. By combining firm-level customs data with a firm-level survey, we are able to match firm characteristics and study the heterogeneous effects of sanctions across firms and diverting and spillover effects of trade sanctions. Finally, we provide the first evidence from Turkey, which is a medium-size upper-middle-income country.

The rest of the paper is divided as follows. Section 2. provides a description of the events that led to sanctions and the details of the sanctions. Section 3. explains the setting and the empirical strategy and Section 4. details the data sources. Section 4 explains the setting and the empirical strategy. Section 5. presents results. Section 6. concludes.

## 2. Context: The shutdown and sanctions

On 24 November 2015, a Russian Sukhoi Su-24 aircraft with tail number 83 was returning to Khmeimin airbase, located in the province of Latakia, in Northern Syria located 35 kilometres south of Turkish-Syrian border. As the aircraft was heading towards the Turkish airspace, Turkish ground-control station officials sent a warning to the aircraft requesting it to change course. These warnings were repeated nine more times within 5 minutes (BBC 2015).

Despite repeated warnings, Russian aircraft did not change course and entered Turkish airspace up to a depth of 2.19 kilometres for about 17 seconds. Consequently, the Russian aircraft was shot down by Turkish F-16 patrolling the Turkey-Syria border. Russian aircraft, hit by an air-to-air missile, flew back into Syria before crashing in the mountainous Jabal Turkmen area of Latakia, which was contested by Syrian government and rebel forces. Two pilots ejected after the aircraft was hit. While one was killed by ground fire by the Turkmen rebels while in the air, the other one was captured upon landing.

A few hours after the incident, the Russian President Vladimir Putin made a public statement, blaming the shutdown as a “stab in the back by terrorist accomplices” and that Russia would not put up with attacks like this one and that Russia-Turkey relations would be affected (BBC, 2015). As Foreign Minister Sergey Lavrov cancelled his trip to Turkey due next day, groups gathered outside of the Turkish Embassy in Moscow to protest. On 26 November, Prime Minister Dmitry Medvedev announced broad economic sanctions against Turkey as retaliation (Nissenbaum, Peker, and Marson 2015).

### 2.1. Timeline of the sanctions

On November 28, the Russian President Vladimir Putin approved a presidential decree (numbered 583), that would provide the legal ground for imposing economic embargos on Turkish goods and services. Following this decree, the Russian Government released an Executive Order (numbered 1296) on 30 November 2015, detailing the sanctions that will be imposed on Turkey which would be effective of 1 January 2016. The sanctions involved various measures such as prohibiting Turkish companies to carry out activities in Russia, employment of new Turkish workers, suspension of visa-free travel between two countries and the banning of charter flights to Turkey (see

Appendix Section: Sanctions for more details on the sanctions). The Russian government imposed an embargo on 17 Turkish products defined by HS-6 codes, which covered fruits, vegetables, flowers, chicken, turkey and salt effective of 1 January 2016 (see Appendix Section: Timeline of product embargo for the full list of sanctioned products).

In the following two years, these bans were gradually lifted. The first change came in October 2016, when Russia excluded 5 products from the banned products list, reducing the number of banned products to 12. In March 2017 and June 2017, Russia excluded 4 and 7 products, respectively. Finally, on 1 November 2017, Russia lifted the ban on the only remaining product (tomato, HS-6 code 070200), from the list ending the embargo.

### 3. Empirical Strategy

The objective is to analyze the changes in Turkish exports caused by the imposition of the Russian embargo on certain products. The estimation equation is derived from the standard gravity model, which has been used in recent literature studying the impact of economic sanctions.

Let trade between an origin country  $o$  and a destination country  $d$  at time  $t$  be described by an Armington-type gravity structure as in Head and Mayer(2014), so that

$$X_{odt} = \frac{Y_{ot}}{\Omega_{ot}} \frac{X_{dt}}{\Phi_{dt}} \phi_{odm} \quad (1)$$

where  $Y_{ot} = \sum_d X_{odt}$  is the value of production, i.e. all exports, in  $o$  at time  $t$ , and  $X_{dt} = \sum_o X_{odt}$  is the value of expenditure, i.e. all imports, in  $d$  and time  $t$ .  $\Omega_{ot}$  and  $\Phi_{dt}$  are the so-called outward and inward multilateral resistance terms that reflect the exports' and imports' relative position in the world trade matrix. The structure of these terms is given by

$$\Omega_{ot} = \sum_{l \in d} \frac{X_{lt}}{\Phi_{lt}} \phi_{olm} \quad \text{and} \quad \Phi_{dt} = \sum_{l \in o} \frac{Y_{lt}}{\Omega_{lt}} \phi_{ldm}$$

The bilateral component  $\phi_{odm}$  subsumes all seasonally-varying bilateral trade barriers and facilitators, which we assume to vary at the month-level denoted by subscript  $m$  (as opposed to  $t$  for year-month).

We estimate Equation 1 with a Pseudo-Poisson Maximum Likelihood procedure regressing bilateral flows between the country of origin  $o$  (i.e. Turkey) and destination  $d$  (e.g. Russia) on origin x time, destination x time, and origin x destination x month fixed effects, thus extending the gravity equation with a month-dimension.<sup>1</sup>

Based on this gravity equation, we implement two complementary empirical analyses based on bilateral trade data aggregated at the product level and Turkish firm-level export data. Since the model applies to Turkey's trade only, and Turkey is always a trading partner, we drop the  $i$  subscript to simplify notation. The data allows us to add a product dimension, which is denoted by the  $k$  subscript. We model Russia's embargo as a bilateral trade friction (i.e., part of  $\tau_{ijt}$ ), which reduces the average trade flow  $\bar{T}$ . In order to account for multilateral resistance terms  $P_{it}$ ,  $P_{jt}$  and world income  $y_{\omega t}$ , we include country-year fixed effects, where subscript  $y$  denotes the year (since the data is available monthly, we use  $t$  index for the monthly-year periods) to model  $y_{jt}$  in equation (2).

In the main analysis we use this gravity equation in a difference-in-differences estimation (DID) method, which exploits the variation in time and country. In the final part of our analysis, we use triple difference (DDD) estimation strategy (where treatment is defined at product, country and time) as it is more suitable for studying diversion and spillover effects of sanctions. We define four embargo periods in line with the removal of sanctions described in Section XX.

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<sup>1</sup> For a robustness, we also provides results using inverse hyperbolic sine which is defined at zero and behaves similarly to a log-transformation (see MacKinnon and Magee, 1990). Although not presented, we also check the robustness of our results using log-transformation. Results can be provided if requested.



- Period 1: from January 2016 until October 2016 where sanctioning of 5 products are removed
- Period 2: from January 2016 until March 2017 where sanctioning of 5 products are removed
- Period 3: from January 2016 until June 2017 where sanctioning of 6 products are removed
- Period 4: from January 2016 until November 2017 where sanctioning of one product is removed

In all specifications, we include treatment dummies for the 5 months preceding the start of the embargo (i.e. January 2016) to address concerns about the pre-treatment trends. Similarly, we include dummies for the 5-months following the end of sanction to capture the persistence in sanctions' effects.

### 3.1. Product-level analysis

Gravity equation with a product dimension allows us to study how the embargo impacts bilateral trade at the product level. We exploit bilateral export data from UN COMTRADE by Turkey, Russia and the other trading partners of Turkey. The analysis is disaggregated at the 6-digit product level of HS classification. Adding a product dimension yields to 232 partner countries and 5306 products. Following Crozet and Hinz (2019), we eliminate all origin-destination-product triads for which we do not observe any trade over the sample period, we have more than 38 million observations. Equation (2) above yields to following the following estimating equation (Crozet and Hinz, 2019):

$$x_{pkt} = \exp(\theta_{kt} + \mu_{pkm} + m_{pt} + \beta \varphi_{p=S} x P_{t=S}) + \varepsilon_{pkt}$$

In the equation above,  $\theta_{kt}$  is the product-time fixed effect,  $\mu_{pkm}$  is partner-product-month fixed effect and  $m_{pt}$  is the total product import of each partner. Our variable of interest is  $\beta$ , which is trade the elasticity of embargo, being interaction of sanctioning country Russia dummy ( $\varphi_{p=S}$ ) and sanctioned period dummy ( $P_{t=S}$ ) effect relevant with the sanction.

### 3.2. Firm-level analysis

To go beyond the bilateral product-level dimension, we complement our previous findings with an analysis using firm-level data. Using the firm-level data allows us to investigate the heterogeneous effects of the embargo by firm characteristics.

For this analysis, we use two sets of data. First, we use Turkish customs data that provides firm-level information on the complete universe of exporting firms. The detailed customs data provides information on monthly exports at the firm-product-destination level. Each observation in our database records data (year and month), a unique firm code, 8-digit product code, the destination country and the exported value (in dollars).

Second, we match the customs data with Annual Survey of Industry and Services, which provides annual information about the firms (e.g., number of employees, gross fixed capital formation, production, wages, and more).

Using unique firm identifiers, we are able to match all of the exporting firms with more than 19 employees. The firm-level analysis goes one step further and additionally adds a firm-level dimension. This allows us to study the heterogeneous effects by firm characteristics.

To estimate the effect of the sanctions on the non-embargoed exports of Turkish firms, we adopt the same difference-in-differences approach as above. However, since we only have one exporting country but many firms which may export the same good, there is a need to control firm-related shocks. Therefore below is extended the gravity equation to be estimated:

$$x_{fpkt} = \exp(\theta_{fpk} + \mu_{fkt} + \phi_{pkm} + \beta \delta_{p=s} x P_{t=s}) + \varepsilon_{fpkt}$$

Here while the coefficient of partner-period ( $\beta$ ), which is variable of interest, remain the same in the equation above, firm-partner-product ( $\theta_{fpk}$ ), firm-product-time ( $\mu_{fkt}$ ) and partner-product-month ( $\phi_{pkm}$ ) fixed effects were added.

Next, we examine the extent to which two more interaction operate during trade sanction among those with trading with Russia. First trade diverting or substitution effect, which measures how successful Turkish firms direct their embargoed exports to non-Russia countries? Second is contagiousness of sanctions toward non-embargoed exports while trading with Russia. Along with the direct effect of sanction following model has three variables of interest (Miromanova, 2019):

$$x_{fpkt} = \exp \left( \theta_{fp} + \mu_y + \tau_m + \omega_t + \underbrace{\beta \delta_{p=s} x \varphi_{k=s} x P_{t=s}}_{direct} + \underbrace{\alpha \delta_{p \neq s} x \varphi_k x P_t}_{substitution} + \underbrace{\gamma \delta_{p \neq s} x \varphi_{k \neq s} x P_t}_{spillover} \right) + \varepsilon_{fpkt}$$

Different from above,  $y$  refers to year subscript. We expect  $\beta, \gamma < 0$  and  $\alpha > 0$ .

## 4. Data and sample

We link a number of datasets together for our study. First, we use Turkish Customs data (*Dış Ticaret İstatistikleri*, in Turkish) which provides that allows us to study the effects of the sanctions on bilateral trade and its firm-level. Data set covers the whole universe of exporting firms and provides monthly trade data at 6-digit HS level starting from 2002. The trade data includes firm-product-destination information which allows distinguishing the evolution of the bilateral trade but also firm-level trade across time. It includes trade value (in USD) and volume. We complement this data with UNComtrade to construct measures on global trade and partner total product import that are used as measures.

In this dataset, if Turkey does not export a product which did in other periods to any country otherwise it is not recorded. Therefore, we filled these sort of cases in zeros to compare the sanction period and sanctioning country effect with other periods and non-Russia countries properly.

Finally, we combine the firm-level customs data with Annual Industry and Services Statistics (*Yıllık Sanayi ve Hizmet İstatistikleri*, in Turkish) which provides detailed firm-level information. By matching firm identifiers in both datasets, we can merge firm-level trade data with annual firm-level information such as turnover, labour costs, number of employees etc. Since dataset represents the complete universe of firms with more than 19 employees, matching of both datasets was close to 100% of the sample. Similarly above, since triple effects estimation strategy requires to add missing observations recording as zero, we ended up with over 5 million observations.

## 5. Results

Russian Federation is a major trade partner for Turkey. In 2014, it was 14th the most important destination for Turkish exports, and sixth one outside of the European Union, after Iraq, the United States, the United Arab Emirates, Iran and Egypt. However, it was the most important importer of Turkish products that were embargoed.

As discussed earlier, Russia removed product sanctions gradually, in four waves during 22 months period. Therefore in the analysis, we group products based on the end of their corresponding sanction period. Before we turn to econometrics, we look at how sanctions affected Turkish exports to Russia. Using only the raw data, the Figure-1 visualizes the monthly export flows from Turkey to Russia, for four groups of sanctioned products and also for products which were not part of the sanctions. We group all of the products that did not face sanctions and call them non-embargoed products.

The figure reveals a few things. First, until the sanctions (i.e., 2016m1), the embargoed products were exported following a cyclical trend, which is expected given that they were mostly food products. Secondly, while sanctioned products were exported roughly at similar volumes from 2010 until the beginning of the sanctions, the monthly export volume of non-sanctioned products was in a declining trend.<sup>2</sup> Third, following the implementation of the sanctions, the

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<sup>2</sup> While the sources of this decline trend requires further investigation, one possible explanation is the violent macroeconomic shocks that Russia faced in 2014 and 2015.

exports of both embargoed and non-embargoed products suffered dramatic drops. Fourth, although exports of embargoed starting picking up as the sanctions were lifted gradually, they remained below the levels observed in pre-embargo period.

Here we see that embargoed product exports could not reach the pre-embargo level despite its seasonal structure. It is surprising to observe that after the 2014 Russian financial crisis import ban in January 2016 effect not only embargoed products but also those who are not subject to any sanction. If we consider trade volume of the non-embargoed group, total monetary loss that we estimated later sections would be greater.

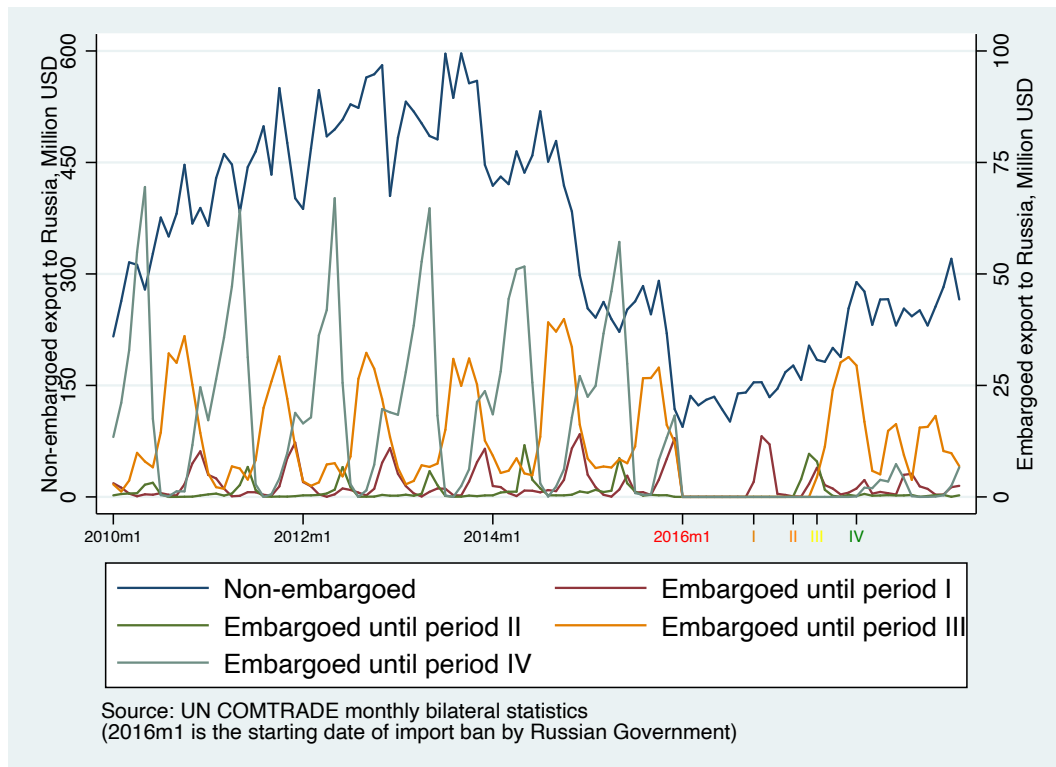


Figure-1: Embargoed and non-embargoed Turkish exports to Russia

To eliminate the seasonal variations and observe the effects of trade sanctions on export trends, Figure 2 presents cumulative exports for both embargoed and non-embargoed products to Russia. The figure shows that while total exports to Russia for all products were on a positive trend, they suffered two breaks: first in mid-2014 due to financial crisis following the drop in oil prices and the consequent devaluation, and second two months before the sanctions (November-December 2015) when the political tensions between Turkey and Russia started harming trade.<sup>3</sup> As the figure shows, starting from January 2016, while the cumulative exports for sanctioned products flat-lined, indicating the halt in the trade of those products, while non-embargoed products continued to increase albeit at a slower pace compared to pre-sanction period.

<sup>3</sup> In our analysis, we include controls to account pre-trend issues econometrically.

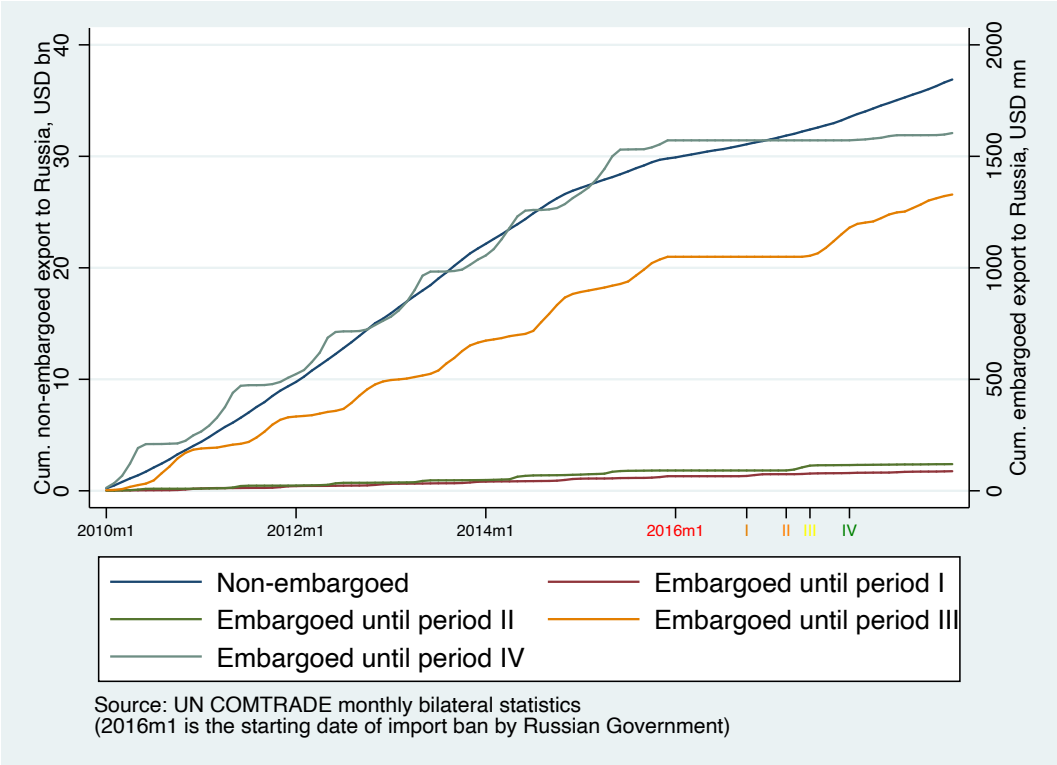


Figure-2: Cumulative embargoed and non-embargoed Turkish exports to Russia

## 5.1. Product-level results

We start with our product-level analysis. Table-1 presents estimation results for embargoed and non-embargoed groups of products. In the first four columns, we estimate the effects of sanctions separately for products grouped according to the sanction period. For example, the first column only includes the products which faced sanctions from January 2016 until September 2016. The “treatment” dummies capture the decrease in the export levels to Russia compared to other partner countries. Each column controls for exports for 6-months prior to treatment period (i.e., August - December 2015), and also 6-months after the end of sanctions for each product group (e.g., October 2016 – February 2017 for period 1).

Results in Table-1 show negative effect of sanctions on the product groups. The estimated coefficients indicate that sanctions were effective in shutting down almost completely the Turkish exports of these products to Russia (for example in the period I,  $e^{-22.711} - 1 = -99\%$  loss). The results also indicate that the estimated effects are not driven by pre-trends (i.e., August - December 2015). Finally, while the negative effects of sanctions disappear in the post-treatment periods for the products groups in periods I to III, negative effects persist for another 6-months for the product that is part of that sanctioning period.

Table-1 product level estimation results-embargoed products

VARIABLES	(1) Period I	(2) Period II	(3) Period III	(4) Period IV
Aug-Dec 2015 (Pre)	0.115 (0.109)	0.082 (0.329)	0.211* (0.095)	-0.064 (0.195)
Jan-Sep 2016	-22.711** (0.088)			
Oct 2016-Feb 2017 (Post)	0.178+ (0.104)			
Jan 2016-Feb 2017		-11.175** (1.061)		
Mar-Jul 2017 (Post)		0.315+ (0.187)		
Jan 2016-May 2017			-21.845** (0.079)	
Jun-Oct 2017 (Post)			-0.119 (0.098)	
Jan 2016-Oct 2017				-22.947** (0.071)
Nov-2017-Mar 2018 (Post)				-2.909** (0.181)
Constant	15.529** (0.016)	12.474** (0.044)	14.468** (0.022)	15.660** (0.027)
Observations	38,880	31,320	48,600	6,372
Pseudo R-squared	0.970	0.891	0.935	0.939
Periodxproduct Dummies	yes	yes	yes	yes
PartnerxproductxMonth Dummies	yes	yes	yes	yes

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\*\* p<0.01, \* p<0.05, + p<0.1

PPML estimates. Dependent variable is export volume.

Robust standard errors clustered by partnerxtime

All estimations also included total product imports of partners.

Table-2 combines all treatment periods in sequential order and presents the effect of embargo over time. Specifically, the table presents the total effects for all products that face embargo (Column 1), products that do not face embargo (Column 2) and all the products combined (Column 3). Results in all columns show that the sanctions generated the strongest effect in exports during the first period, and gradually diminished over time. For instance results in column 1 show that, while the exports levels dropped 99% in the first period (January – September 2016), the negative effect decreased to 3.7% in the last period (June 2016 – October 2017). The coefficient in the last period is statistically insignificant as in this period only one product faced sanctions while other 16 saw an increase in their trade following the lifting of the sanctions.

Column 2 presents results for all non-embargoed results and strong negative effects around 70% in the first period, decreasing over time to 59% in the last period. Note that the coefficients in column 2 are much smaller as the number of products involved (around 38 million non-embargoed products vs 17 embargoed products) and the export levels are much higher than those for the embargoed products.

The final column of Table-2, combines all the products (embargoed and non-embargoed). The estimated coefficients in this column are very similar those for non-embargoed products, which suggests that the main effects of trade loss in terms of export volumes were driven mainly by the loss in the trade of non-embargoed products.

Table-2 product level estimation results-all, non-embargoed and all embargoed products

VARIABLES	(1) Embargoed	(2) Non- embargoed	(3) All products
Aug-Dec 2015 (Pre)	0.069 (0.082)	-0.606** (0.088)	-0.526** (0.068)
Jan-Sep 2016	-21.574** (0.069)	-1.205** (0.041)	-1.301** (0.039)
Oct 2016-Feb 2017	-0.717** (0.222)	-1.106** (0.050)	-1.068** (0.061)
Mar 2016-May 2017	-2.051** (0.458)	-0.972** (0.073)	-1.038** (0.078)
Jun 2016-Oct 2017	-0.037 (0.089)	-0.882** (0.057)	-0.818** (0.053)
Nov-2017-Mar 2018 (Post)	-0.680** (0.107)	-0.719** (0.047)	-0.715** (0.045)
Constant	15.108** (0.012)	14.348** (0.005)	14.356** (0.005)
Observations	125,172	38,475,756	38,600,928
Pseudo R-squared	0.948	0.920	0.920
Periodxproduct Dummies	yes	yes	yes
PartnerxproductxMonth Dummies	yes	yes	yes

\*\* p<0.01, \* p<0.05, + p<0.1

PPML estimates. Dependent variable is export volume.

Robust standard errors clustered by partnerxtime

All estimations also included total product imports of partners.

Are these declines in trade volumes significant in monetary terms? To put a figure to the loss in exports, we do a “back of the envelope” calculation and estimate the monetary costs of the embargo using the coefficients estimated above. Following the literature (Crozet and Hinz 2017; Miromanova 2019), we first calculate the average monthly export value to Russia for two years that precede the sanctions and multiply these average trade values with the coefficient of treatment above, the number of products and duration of sanctions in terms of months. For example, average monthly export to Russia for the product group for which the sanctions ended in October 2016 (period I), the average monthly value of exports is 4,161,213 USD. Given that sanctions caused a drop 99% in exports, it is reasonable to say that the exports of these products vanished completely during the sanctions. Considering that sanctions lasted nine months and covered five products, the decline in exports corresponds to  $4,161,213 \times 9 \times 5 = 185,382,039.2$  USD. We estimate the trade losses for all embargoed and non-embargoed products<sup>4</sup> in the same fashion and find that losses in exports for the products in the first group to be about 965,764,544 and second group to be around 4,858,261,096 USD.<sup>5</sup> As the embargo lasted 22 months, it generated a total of 5.8bn USD in export losses which equivalent to 4% of 2018 total export of Turkey for all products and to all countries.

<sup>4</sup> Detailed monetary trade losses for embargoed products and non-embargoed products is in Appendix.

<sup>5</sup> We do not include post- and pre-treatment effects in the calculation as some of the coefficients are not statistically significant. This means that the estimated trade losses present the lower bound.



## 5.2. Firm-level results

In this section, we complement the product-level analysis by studying the effects at firm-level. This analysis is vital for understanding the actual effects sanctions had on firms and how firms facing sanctions adjusted. Faced with sanctions, firms exporting to Russia had two options. First, faced with sanctions, firms can divert their exports to other foreign markets and compensate their export losses. If this is the case, given the increase in the exports to other countries which constitute the control group, it would lead to overestimation of the coefficients and cost of sanctions. However, diverting trade to other markets may not be quick or straightforward. Firms may find it difficult to divert their trade in other markets as they may lack experience in international markets or may face fierce competition by other firms from other countries with trade existing trade relationships in those markets. If firms face difficulties accessing other foreign markets, they may direct part of their potential exports to the domestic market, which would bias down the estimated coefficients, leading to smaller estimates.

Table-3 presents results at firm-level for non-embargoed products, for all sanction periods. Note that unlike previous tables, here the dependent variable is the log of exports.<sup>6</sup> Column (1) of table-3, shows that in the first period of sanctions, Turkish exporters suffered a loss in their exports around 14.1% ( $1 - \exp(-.203)$ ). Over the period, the negative effects of the sanctions decreased over time to percentage loss fell significantly down to 2.6% in the last period. Column (2) is a robustness check of column (1) as it adds the seasonal variations, has similar findings. Less trade loss values comparing to the product-level analysis above implies that Turkish exporters direct their exports to their home market. However, more importantly, our findings are consistent with product-level analysis above, meaning that Russian sanction initially hit Turkish exports strong and their effects weakened over time.

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<sup>6</sup> To referee: As explained at the end of the draft, in my initial analysis, I used log transformed export values as the dependent variable. To provide estimates that are comparable to the most recent literature studying the effects of sanctions (Crozet and Hinz, 2017; Miromanova, 2019), I decided to use PPML (level of exports). I am currently waiting for the results with PPML to be released following the verification of the results by agents at the on-site access site based in Istanbul (Turkey). The results using PPML are consistent with those presented in the current version. The interpretation of the estimated coefficients, however, are different.

Table-3 firm-level estimation results of non-embargoed products

VARIABLES	(1) Non-embargoed	(2) Non-embargoed
Aug-Dec 2015 (Pre)	-0.037* (0.015)	-0.073** (0.017)
Jan-Sep 2016	-0.203** (0.019)	-0.224** (0.021)
Oct 2016-Feb 2017	-0.140** (0.020)	-0.161** (0.021)
Mar 2016-May 2017	-0.101** (0.021)	-0.097** (0.024)
Jun 2016-Oct 2017	-0.037* (0.018)	-0.084** (0.020)
Nov-2017-Mar 2018 (Post)	-0.036** (0.013)	-0.018 (0.015)
Constant	8.889** (0.000)	8.953** (0.000)
Observations	6,348,615	5,803,017
R-squared	0.867	0.886
IDxpartnerxproduct dummies	yes	yes
IDxperiodxproduct dummies	yes	yes
Partnerxproductxmonth dummies	no	yes
F-stat	23.28	22.39

\*\* p<0.01, \* p<0.05, + p<0.1

OLS estimates. Dependent variable is asinh value of export volume.

Robust standard errors clustered by partnerxproduct

Finally, we investigate the total effects of sanctions on firms by looking at three margins: drop in exports of embargoed products (*direct effects*); drop in exports of non-embargoed products (spillover effects), diversion of exports of embargoed products to other markets (*substitution effect*). Results in Table 4 show indicate the direct effect of trade loss of embargoed products to Russia in the sanction period as a whole is equivalent to 65% ( $e^{-1.052} - 1 = -65\%$ ). On the other hand, this loss is attenuated with substitution effect by directing export flows to other countries, although the increase in exports to other markets remain lower than the direct losses. Finally, the trade losses are further amplified by spilling over to non-embargoed. Overall, the total of three components for intensive margin is 48%, which is much greater than import losses estimated for Russian firms who had faced similar sanctions from Western countries following the tensions in Crimea in 2014 (Miromanova, 2019).

Table-4 firm-level estimations of firms trading with Russia (intensive margin)

VARIABLES	(1)	(2)
Direct	-1.052** (0.125)	-1.021** (0.125)
Substitution	0.428** (0.025)	0.433** (0.025)
Spillover	-0.037** (0.011)	-0.032** (0.011)
Constant	8.474** (0.002)	8.474** (0.002)
Observations	5,346,389	5,346,389
R-squared	0.459	0.459
partnerxID dummies	yes	yes
month dummies	yes	no
year dummies	yes	no
period dummies	no	yes
F-stat	121.2	121.0

OLS estimates. Dependent variable is asinh value of export volume.

Robust standard errors in parentheses

\*\* p<0.01, \* p<0.05, + p<0.1

Robust standart errors clustured by partnerxproductxID

## 6. Concluding remarks

When Turkey shot down a Russian fighter jet over the Syrian border, Russia retaliated with an embargo on certain food exports from Turkey. Exploiting this natural experiment, this paper provides causal evidence on the direct impact of the embargo on sanctioned products and indirect effects on the other exports to Russia and exporters.

We carry out the analysis in two steps using a gravity equation in a difference-in-differences framework. First, using bilateral trade data, we show that the sanctions disrupted completely Turkish exports of sanctioned products to Russia. Over the 22 months period, we estimate a loss of USD XX billion in exports for the embargoed goods. Moreover, we find significant spillover effects where Turkish exports to Russia of non-embargoed products were also hit by the hostile context. We find the loss of exports in non-embargoed products to be around USD XX billion. Overall we find that the political tensions between both countries have reduced Turkish exports causing a loss about USD 5.8 billion.

In the second part of our analysis, we focus on the firm-level dimension of the sanctions to study the underlying mechanisms. Using customs data covering all of Turkish exporters, we show that Turkish firms who were previously trading with Russia, have reduced their exports to Russia, diverted part of it to other foreign markets and to the domestic market.

This study contributes to the burgeoning literature that focuses on understanding the impact of trade sanctions on bilateral trade and exporting firms. To the best of our knowledge, we are

first to study the effects of trade sanctions on the receiving country using a natural experiment. Our results documents how unexpected trade sanctions can impact the economy and trade of the country exposed to sanctions.

Countries have long used economic and trade sanctions as a foreign policy tool to impose costs on their adversaries. Our findings suggest that such embargoes can have a significant impact on bilateral trade even if the embargoes that target a relatively small set of products. Whether these spillover effects are desired or not by the imposing government, it surely is an important piece of information that should be taken into account by the policymaker.

#### *A note to the referee: Next steps*

As explained in the text, I use two micro-datasets (i.e., customs and firm-level data) that are accessible to researchers through on-site access points located in Turkey. Results obtained using these data sets can only be included in the draft following their approval by the responsible officer.

Due to unusual delays on the side of the data providers that were beyond my control, I have not been able to include the following results:

- 1) Further results about the trade diversion: Domestic vs. international markets
- 2) Heterogenous effects by firm characteristics (i.e. firm size, experience in foreign-trade, number of foreign-markets accessed)
- 3) Heterogenous effects by sanctioned product
- 4) PPML results for the full set of tables

These results will be released very soon and will be included in the next draft.

## 7. References

- Bapat, Navin A., Tobias Heinrich, Yoshiharu Kobayashi, and T. Clifton Morgan. 2013. "Determinants of Sanctions Effectiveness: Sensitivity Analysis Using New Data." *International Interactions* 39(1): 79–98.
- BBC. 2015. "Turkey's Downing of Russian Warplane - What We Know." *BBC News*. <http://www.bbc.com/news/world-middle-east-34912581>.
- Coulibaly, Brahim. 2009. "Effects of Financial Autarky and Integration: The Case of the South Africa Embargo." *Journal of International Money and Finance* 28(3): 454–78.
- Crozet, Matthieu, and Julian Hinz. 2017. "Friendly Fire: The Trade Impact of the Russia Sanctions and Counter-Sanctions." *Economic Policy*. [https://www.ifw-members.ifw-kiel.de/publications/friendly-fire-the-trade-impact-of-the-russia-sanctions-and-counter-sanctions/kwp\\_2059-updated-version-july-2017](https://www.ifw-members.ifw-kiel.de/publications/friendly-fire-the-trade-impact-of-the-russia-sanctions-and-counter-sanctions/kwp_2059-updated-version-july-2017).
- Eaton, Jonathan, and Maxim Engers. 1999. "Sanctions: Some Simple Analytics." *American*

- Economic Review* 89(2): 409–14.
- Haidar, Jamal Ibrahim. 2017. “Sanctions and Export Deflection: Evidence from Iran.” *Economic Policy* 32(90): 319–55. <https://academic.oup.com/economicpolicy/article-lookup/doi/10.1093/epolic/eix002> (November 24, 2019).
- Hufbauer, G.C., J.J. Schott, and K.A. Elliott. 2009. *Economic Sanctions Reconsidered, 3rd Edition*. Peterson I. Peterson Institute Press.
- Irwin, Douglas A. 2005. “The Welfare Cost of Autarky: Evidence from the Jeffersonian Trade Embargo, 1807-09.” *Review of International Economics* 13(4): 631–45.
- Kaempfer, William H, and Anton D Lowenberg. 1988. “The Theory of International Economic Sanctions: A Public Choice Approach.” *American Economic Review* 78(4): 1304–6.
- MacKinnon, JG, and Lonnie Magee. 1990. “Transforming the Dependent Variable in Regression Models.” *International Economic Review* 31(2): 315–39.
- Michaels, Guy, and Xiaojia Zhi. 2010. “Freedom Fries.” *American Economic Journal: Applied Economics* 2(3): 256–81.
- Miromanova, Anna. 2019. *The Effectiveness of Embargoes : Evidence From Russia*.
- Miromanova, Anna. 2019. *Quantifying The Trade Reducing Effect of Embargoes: Firm Level Evidence From Russia*.
- Nissenbaum, Dion, Emre Peker, and James Marson. 2015. “Turkey Shoots Down Russian Military Jet.” *The Wall Street Journal* : Hamed, Safin, ‘Barzani Asks PKK to Quit Iraqi Kurd.
- Pandya, Sonal S., and Rajkumar Venkatesan. 2016. “French Roast: Consumer Response to International Conflict-Evidence from Supermarket Scanner Data.” *Review of Economics and Statistics* 98(1): 42–56.

## 8. Appendix

### 8.1. Appendix Section: Timeline of product embargo

- 1) In November 2015, Russia issued a presidential executive order (No 583) to ban the import of agricultural products, raw materials and food products, effective on **January 1, 2016**.
- 2) **In October 2016**, Russia makes some amendments to import ban by excluding following products:
  - a. **080510** fresh and dried oranges
  - b. **080520** fresh and dried mandarins
  - c. **080910** fresh apricots
  - d. **080930** fresh peaches including nectarines
  - e. **080940** fresh plums and blackthorn
- 3) **In March 2017**, the Russian government made amendments to list by eliminating products below:
  - a. **060312** Clove
  - b. **070310** Onion and shallots

- c. **070410** Broccoli
- d. **250100** Salt

- 4) **In June 2017, the following products have been excluded from the prohibiting:**
- a. **020714** Chicken
  - b. **020727** Turkey
  - c. **070700** Cucumber and gherkin
  - d. **080810** Apples
  - e. **080830** Pears
  - f. **080610** Grapes
  - g. **081010** Strawberries
- 5) Effective on November 1, 2017, tomato (**070200**) ban lifted by the Russian Government

## 8.2. Appendix Section: Sanctions

Beyond the embargo on certain products, Russia also imposed other sanctions which we list here.

### **Turkish Companies Prohibited From Carrying Out Activities in Russia:**

Prohibitions and limitations apply to the activities of companies and organizations which are headquartered in Turkey or are controlled by Turkish citizens.

Russian legislation defines criteria for “control” in Articles 5(1) and 5(2) of the Federal Law titled Order of Foreign Investment in Economic Structures Strategically Important for State Defense and Security, numbered 57-F3 and dated 29 April 2008. Accordingly, persons are deemed to have the authority to control the company or organization where they:

- Hold more than 50% of votes as shareholders,
- Hold less than 50% of votes as shareholders, but control the company’s decision-making mechanism,
- Are authorized to appoint the CEO or more than half of the executive body members of the company or organization, or
- Are authorized to appoint more than half of the board of management or the executive body without any conditions,

Another important point is that sanctions in the decree also cover Turkish companies with their headquarters located in Russia. However, the Russian government failed to indicate the fields of operation for companies which are subject to these sanctions.

### **Employing Turkish Citizens Prohibited**

Employers and contractors are prohibited from employing Turkish citizens as of 1 January 2016. However, Turkish employees who were already in an employment or legal relationship with an employer in Russia on 31 December 2015 may continue to be employed.

The Russian government created an exemption for 53 companies to continue employing Turkish citizens.

### **Visa-Free Travel Agreement Suspended**

The visa-free travel agreement between Russia and Turkey has been suspended from 1 January 2016. Previously, Russian and Turkish citizens could travel freely between the two countries without a visa.

### **Charter Flights From Russia To Turkey Banned**

The Russian government has banned charter flights to Turkey, except those used to bring Russian tourists from Turkey back to Russia. Additionally, supervision of regular commercial flights has increased.

## **Tourism Banned**

Russian tour operators and tourism agencies have abstained from selling Russian citizens tour packages to Turkey.

## **Transportation Prohibited**

Supervision has increased for Turkish sea transportation companies operating in the Sea of Azov and Black Sea ports, as well as companies involved in land transportation through Russia. The number of trucks and lorries from Turkey which are accepted to pass through Russia is now limited. In 2015, around 8,000 trucks and lorries were accepted to pass through Russia. However, this number is set as a maximum of 2,000 for 2016.

## **Joint Activities Suspended at Government Level**

Commercial and economic activities between Turkey and Russia at the government level have been suspended. However, the Russian government has appointed their Ministry of Economy to negotiate with Turkey about:

- The bilateral Agreement on Trade in Services and Investments,
- The Middle-term program for economic, trade, scientific, technical and cultural cooperation for 2016-2019,
- Formation of the joint Fund for Financing Investment Projects in Russia and Turkey.

Russia's sanctions directly affect Turkey, Turkish companies and Turkish citizens. However, they also indirectly affect many European and American companies. Some of these companies face severe procurement problems where they have production facilities in Russia, yet source raw materials or parts required for these facilities from Turkey.

On the other hand, it is positive that the sanctions exclude on-going investment undertakings in Russia, as well as Russia's gas exportation to Turkey. These are the two largest goods and services exchanged between the countries.

It is important to note that penal clause or compensation claims will inevitably arise for Turkish and foreign parties which are unable to fulfil their undertakings and are forced to cancel reservations.

Therefore, serious and legitimate concerns exist regarding the rights and obligations of parties involved in agreements which are already executed in Turkey for future expected businesses in Russia, or agreements which would have been executed in connection with the on-going agreements in Russia.

Parties who are obliged to provide goods or services are preparing to file for objective impossibility and force majeure objections. Meanwhile, parties which have made a payment or submitted a guarantee letter are preparing for the collection of penal clauses and compensation.

Investment arbitration against Russia is considered possible for investors whose long term undertakings are affected by the sanctions. Investors would be able to seek penal and compensation amounts which they might have to pay for breach of these undertakings.



The Russian government – as if acknowledging the affects and results of the sanctions which cause a logarithmic domino effect for governments and companies – has given some signals indicating that the sanctions will be eased. In this regard, it is speculated that the Russian Ministry of Commerce is working on draft legislation to ease the sanctions.

Considering the stadiums and other facilities required to be built for the FIFA World Cup to be held in Russia in 2018, Sberbank's activities in Turkey, Rosatom's nuclear center in Turkey, as well as all other commercial projects and benefits, the clear preference is to lift the sanctions altogether. However, if this cannot be done in the near future, it is best for both Turkey and Russia to ease these sanctions to keep the commercial effects at minimum.

### 8.3. Appendix Section: Monetary cost of Russia sanctions

	non-embargoed			
	period I	period II	period III	period IV
<b>average monthly trade to Russia in 2015 &amp; 2014 (USD)</b>	89149.28	89149.28	89149.28	89149.28
<b>percentage loss</b>	84%	76%	77%	71%
<b>number of months</b>	9	5	3	5
<b>number of products in 2014 &amp; 2015</b>	3773	3773	3773	3773
<b>cumulative loss (USD)</b>	2553147308	1285323140	774266398.3	1193163806
<b>total (USD)</b>				5805900653

	embargoed			
	period I	period II	period III	period IV
<b>average monthly trade to Russia in 2015 &amp; 2014 (USD)</b>	4161213	450522.6	2292509	22283060
<b>percentage loss</b>	99%	99%	99%	99%
<b>number of months</b>	9	14	17	22
<b>number of products in 2014 &amp; 2015</b>	5	4	7	1
<b>cumulative loss (USD)</b>	185382039	24976972.9	270080485.3	485325047
<b>total (USD)</b>				965764544

	all products			
	period I	period II	period III	period IV
<b>average monthly trade to Russia in 2015 &amp; 2014 (USD)</b>	104828.2	104828.2	104828.2	104828.2
<b>percentage loss</b>	85%	77%	77%	71%
<b>number of months</b>	9	5	3	5
<b>number of products in 2014 &amp; 2015</b>	3790	3790	3790	3790
<b>cumulative loss (USD)</b>	3031709394	1528376409	917849222.1	1408752766
<b>total (USD)</b>				6886687791