ERASMUS UNIVERSITY ROTTERDAM

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MSc Economics & Business

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Do Sanctions Backfire?

Evidence from the Western Economies and Russia Sanctions

Abstract

The aim of this thesis is to investigate whether sanctions have a negative effect also on the sanctioning economies and not only on the targeted ones. I investigate the recent sanctions imposed by the Western Economies (i.e. Australia, Canada, the European Union and the USA) on Russia following the Crimea crisis. I collect quarterly data on industry performance, exports by products and FDI from 2010 until 2016 to study whether they are affected by sanctions. The results prove that European Union countries are somewhat negatively impacted at an industry level by the sanctions; while for the other sanctioning countries such effect is not observed. Exports are impacted as well, while FDI are not. The evidence shows that the use of external financing at country level hinders the performance of highly exposed industries to the Russia markets. However, when looking at the industry level of debt such phenomenon is not observed. Furthermore, those countries that are closely related to Russia due to historical reason benefitted from the sanctions in term of industry performance as they became more important for Russia.

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1. Introduction

On May 28th, 2002, the NATO summit in Rome signed a new era of the relationship between the western world and the ex-soviet regime of Russia. In fact, since that day new cooperation agreements have been signed between western countries and Russia. In particular, the European Union increased its trade agreements with Russia, which has become one of the top five trading partners of Europe in terms of both imports and exports. This new strong relationship saw its peak in 2011 with the EU-Russia strategic partnership. The partnership was based on a set of common strategic objectives to be reached through financial support and cooperation. In addition, also foreign direct investments have become an important element in the EU-Russia relationship, with Europe being the largest investor in Russia in 2011[1]. However, following the annexation of the Ukraine region of Crimea to Russia in March 2014 which was not recognized by the European Union and the USA (and the western countries in general) the relationship sharply worsened. Russia was excluded from the G8 meeting that became the G7 meeting and was held in Brussels instead of Sochi. In addition to this, western economies started sanctioning Russia. Such sanctions are both political and economic. Many analyze the effect of such sanctions on both the Russian and the western economies. The sanctions are of different kinds: from those aiming at singles individual and entities to those affecting specific products or entire sectors. The literature is extensive and investigates sanctions in several different ways finding opposite results.

In my thesis, I study the effects of sanctions of the European Union 28 member states, Australia, Canada and the USA on Russia. The aim is to investigate the effects of these sanctions adding a piece of evidence to previous literature studying different aspects. My analysis is performed at two different levels. On the one hand, I investigate the industry level effects. The new feature of the analysis considers industry level effects of the sanctions on all the industries in the Western economies and, in particular, those industries that are more likely to be impacted. In fact, I study the impact on industry performance measure such as production costs (e.g. producer price index), total production and turnover.

[1] http://europa.eu/rapid/press-release_MEMO-11-104_en.htm

Moreover, I consider whether industry characteristics such as the level of debt can have a greater impact on the performance of an industry when the sanctions are imposed. On the other hand, I investigate the macro economic effects of sanctions. Therefore, I study whether sanctions affect exports and foreign direct investments. The analysis is of interest not only because it contributes to current literature but also because it examines all the sanctioning countries, their industries and their exports. The results show that sanctions do have an impact on industry performance for the European 28 member economies when the industrial level of debt increases. For Australia, Canada and the USA such effect is not observed. Sanctions also bring to a decline in exports and FDI for those countries where the level of debt across industries increases.

The remainder of the paper is organized as follows: Section 2 reviews the previous research on this topic; Section 3 describes the data used in the analysis and the related methodology; Section 4 analyzes the results and their meaning; Section 5 outlines the limitations; finally, Section 6 draws the conclusions.

2. Literature Review

Political and economic sanctions have been widely used by western governments as a punishment measure for those countries not respecting international laws and policies since the beginning of the 20th century. Dreger et al. (2016) identify three types of sanctions: 1) those directed against individuals; 2) sanctions against specific entities; and 3) sanctions against entire sectors of the economy. The latter have a greater economic impact, especially when strategic industries are involved. Previous literature deeply analyzes sanctions and their effects in several ways for both sanctioned and sanctioning countries. The results are generally mixed depending on the case studied and the way the sanctions are investigated. On the one hand, some find evidence of no effect from the sanctions. Pape (1997 & 1998) claims that only few economic sanctions were successful (specifically, in 5 out of 115 cases analyzed). Moreover, based on his analysis, he argues that there are three main hypotheses under which economic sanctions can effectively work. First, sanctions should be more effective when the controversy is a minor issue that does not affect the target country's territory or security. Secondly, sanctions should be more effective when the targeted country's economy depends greatly on the coercer. Thirdly, sanctions should have more effects in countries with lower income distribution equality. In fact, countries opening to trade bring more benefits to those who have the abundant factor in the economy while negatively affects the others, thus increasing income inequality. When sanctions are imposed, trade is limited and therefore income inequality is reduced. Therefore, whenever a country has great levels of income inequality the effect of sanctions will be perceived to a higher extent.

On the other hand, other authors analyze successful sanctions and investigate the reasons behind success. Blanchard and Ripsman (1999) describe the main preliminary conditions for success: first, the target must underestimate the impact of sanctions; secondly, the misperception of sanctions is corrected only after sanctions have been imposed and thus, it is too late to avoid the damages. Drezner (2003) claims that most of the studies finding no effect of sanctions might be understating such effect because of selection bias. In fact, the author explains that, in most of the cases, the threat of sanction being imposed itself is

effective, leading to the desired results by the sender. Thus, the threat of economic coercion is very effective and should be considered as well when sanctions are analyzed. Elliott et al. (2008) describe and discuss two different types of sanctions: trade sanctions that aim at hindering the sanctioned country's trade activity through restricting its exports and imports; and, financial sanctions aiming to limit the financing. The first kind of sanction usually affects the foreign sales and exchange rate of the sanctioned country. A drawback of this strategy is that in certain cases also the output of the sanctioning economy is affected as its exports to the targeted economy decrease. Financial sanctions, instead, affect the target country through higher interest rates. Regarding this distinction, Torbat (2005) shows how financial sanctions are more effective than trade ones and are less harmful to the sender country. Finally, the authors outline four key conditions for sanctions to be effective: the goal must be relatively modest; the target country is much smaller than the sender; the sanctions are imposed quickly and effectively; and the sanctioning country faces little or no economic or political cost. Giumelli and Ivan (2013) analyzing four case studies (Belarus, Iran, Myanmar and Syria) argue that European Union sanctions achieve several foreign policy objectives such as clarifying EU foreign strategy, views and values. In addition, the authors distinguish among the coercing, constraining and signaling effect of sanctions and stress that such sanctions must be carefully evaluated as they should never become unsustainable for the targeted economy as well as for the sanctioning economies (i.e. the European Union members).

Another set of studies shows that sanctions can affect both sanctioning and sanctioned countries. Some studies find that smart sanctions are effective (Morgan and Schwebach, 1995; Cortright and Lopez, 2000); while, others find that only severe sanctions may have an effect (Lam, 1990; Hufbauer and Oegg, 2003). Kaempfer and Lowenberg (2007) find that larger and self-sufficient countries can absorb sanctions more easily than smaller economies. Caruso (2003) reports negative effects of economic sanctions on trade. Similarly, Frank (2017) using a gravity model shows the effect of sanction on trade value. His results show how moderate sanctions aiming directly to a sector are more effective while no or little evidence is found for limited sanctions (i.e., product specific). Neuenkirch and Neumeier

(2015) show how harmful sanctions imposed by the US and the UN can be to the annual real per capita GDP growth rate of the targeted country. In general, the rate decreases by more than 2 percentage points and the effect can last up to 10 years. Afesorgbor and Mahadevan (2016), instead, observe a new aspect of sanctions effects on targeted economies that is a reduction in income inequality.

Some studies already confirm that bilateral trade between the EU and Russia has decreased after the tensions and the sanctions. Sanctions can be seen as trade impediments such as antidumping duties, which cause trade to decline (Pierce, 2011; Chandra and Long, 2013). However, one need to be cautious when doing so as it might be harder for industries hit by anti-dumping duties to find other markets than it is with trade sanctions. Not much literature has focused on this reverse impact caused by economic sanctions. Farmer (2000) studies the economic impact of the sanctions on the sanctioning country. The author distinguishes between four different impacts. The first one is an immediate economic loss due to the decrease in exports that harms the economic efficiency, also due to fewer possibilities to benefit from economies of scale. This effect greatly depends on the reliability of the economy (e.g. the work force, stable economic policies etc.). A second effect is driven by additional economic losses over time that might negatively affect the economic growth permanently through a decline in factor productivity and product innovation. Another effect is the potential loss of comparative advantage as it can destroy monopoly rents depending on the competitive position of the sanctioning country. Finally, there might be additional temporary costs due to the necessity of finding new trade partners.

In theory, according to the Melitz (2003) model, as the cost for exporting to Russia increases, the productivity cutoff level for exporting will increase implying that some firms will stop exporting and only sell domestically. This will increase the domestic turnover and decrease foreign turnover within industries. This phenomenon is defined as trade destruction. However, when one export market disappears firms might search for others to compensate. Then, the foreign turnover will not be affected or even increase, leading to trade diversion. Previous studies of antidumping duties find mixed results as some find trade destruction effects (Gunnar, 2003) and others trade diversion effects (Brenton, 2001).

Therefore, my analysis adds pieces of evidence to the industry level effects of sanctions for sanctioning economies.

Veebel and Markus (2015) focus specifically on the EU-Russia case stating that the sanctions have never reached the heart of Russian economy that is the export of energy carriers and raw materials. Many others have analyzed the recent sanctions on Russia by the European Union as well as the counter-sanctions of Russia on the European sanctioning countries (Kutlina-Dimitrova, 2015). Shirov et al. (2015) elaborate on the effect of such sanctions both on Russia and on the European Union as the economic integration between these two economies has increased significantly in the last decades. The authors state that short-term effects of sanctions on Russia are difficult to identify since from 2013 Russia has started facing substantial economic issues. In fact, the positive shock of the shale oil production in the US and Canada combined with a low Chinese demand induced world crude oil price to decline by more than 50 per cent (Tuzova and Qayum, 2016). In general, the effects on both the EU and Russia can be observed for the energy sector, financial sector, cooperative ties and trade of high technology products. More specifically, the authors claim that sanctions have mirror effects. For example, the limited access to external finance for Russian companies will hurt also European banks for which Russian banks and companies are first class borrowers. In addition, the authors claim little significance for the foreign direct investments (FDI).

Crozet and Hinz (2016) similarly analyze the effects of Russian sanctions from the perspective of the sanctioning countries. Their analysis takes two approaches: on the one hand, they employ a global perspective and estimate a loss trade of 3.2 US billion Dollars per month due to the sanctions. On the other hand, they analyze French firm-level data to estimate a micro effect of sanctions. In addition, they also investigate the trade finance limitations imposed by the sanctions. Their results show that firms and products relying more on financial intermediation are those mostly hit by the sanctions. To estimate the exposure to trade finance, the authors use Turkish firm-level data to compute their variables. The authors justify the use of Turkish data as a good proxy for payment contract in Russia, claiming that there are many similarities between these two countries. In fact,

both are emerging markets, have similar GDP per capita, have similar financial system in terms of development and are equally distant from France. With regards to the effects on the financial markets, many analyze and observe the sharp decline in stock prices, the depreciation of the Ruble and the flight of capital from Russia due to both the imposition of the sanctions and the fall of oil price, on which Russian economy greatly depends (Dolidze, 2015).

Therefore, my analysis integrates to the existing literature, investigating the effect of sanctions on the sanctioning countries. More specifically, analyzing the recent sanctions on Russia by the European Union, I perform a twofold analysis: at industry level studying the different performance measures of a set of industries; and, at a macroeconomic level studying the FDI and total exports dynamics within the sanction framework.

3. Data & Methodology

As explained previously, my study analyzes the effect of sanctions on the sanctioning countries. The analysis is two folded: on the one hand, I investigate whether the performance of some specific industries is affected. On the other hand, I analyze the effect of sanctions on total exports, industry level exports and Foreign Direct Investments (FDIs). The United States of America, the 28 member states of the European Union, Australia and Canada imposed the sanctions on Russia during the first quarter of 2014. The sanctions follow the same principles, as they are coordinated and were agreed and shared by the mentioned governments. To investigate the effect of sanctions on these sending economies I analyze their macro-industries and study the effect on those that are mainly impacted by the sanctions. These industries are the same across the different economies and are the following: food, pharmaceutical, electrical, machinery and equipment and transports. These industries are those most exposed to the Russian market[2] since they are closely related to the sanctions framework. I collect quarterly data on industry performances from governments' statistical databases. The period analyzed spans from 2010 until 2016,

[2] However, their exposures are in most of the cases negligible compared to their total operations, for the USA particularly. In fact, when imposing sanctions, governments always consider possible negative consequences for their economies and try to limit them.

covering both the period before the sanctions until the most recent data available. The following subsections describe the data used and the methodology followed to perform my study for the industry level and macro analysis.

3.1 Industry Performance Analysis

For the industry performance analysis, I build two main datasets: one composed by the 28 member countries of the European Union and another one for the USA, Canada and Australia together. The datasets are different because of a different reporting method between the EU and the other countries. In fact, the European Union reports data in indexes constructed on a base year while the other countries report in values. In addition, they differ in the industries splits as the European Union splits its industries in 30 sectors while the remaining countries in 21. However, in general, these macro industries are similar and differ just in their different levels of aggregation. To have a deeper insight about the industries selected for each country please refer to Table 1 and 2 of Appendix A.

In the following paragraphs, I first describe the data retrieved and used; afterwards, I explain the methodology and regression model used to perform the analysis. An overview of the variables collected, their related databases and statistic is summarized in table 3 of Appendix A and tables 1 to 5 of Appendix B.

3.1.1 Countries Data and Statistics

EUROPE

For the European Union, I consider all the 28 member states and their 29 macro-industries. The main databases used are the Eurostat website for short-term industry-level business statistics, the OECD database for country and time variant debt to surplus ratio, the World Bank for oil prices and real effective exchange rate of the Russian Ruble. For the EU, I choose six industries based on the main EU export industries to Russia and the industries mostly hit by the sanctions. In fact, according to the European Parliamentary Research Service (EPRS) (2015) the top trading industries are machinery (23%), cars (12%), electrical and electronic (10%), agri-food (8%) and medicines (7%). I also add capital goods as the trade sanctions mostly include dual use goods or military goods, but as data is lumpy in the latter industry, I use broader industries linked to dual use goods, such as transport.

Eurostat uses NACE Rev.2 classifications of industries; I use the two-digit level classification, which splits among 99 divisions. Also, due to the availability of the data from the Eurostat, I focus on two main areas: mining and quarrying and manufacturing; thus, I collect data on 29 industries for each of the 28 countries of the EU for a total of 22,736 observations. However, as data is not always complete or some countries are not producing in all industries, observations vary depending on the industry. Therefore, my data is a panel data with quarterly observation for 28 countries (the European Union countries) for a period of 7 years from the first quarter of 2010 to the last one of 2016.

As explained before, the European Union, as well as the other sanctioning countries, do not prohibit explicitly export of specific goods to Russia besides the military and defense ones. Dual-use goods are targeted as well. This group includes goods, software and technologies that can be used for both civilian and military applications; thus, it is difficult identifying which products and industries specifically can be classified as dual-use. According to the European Commission[3] the dual-use products are produced across a wide range of industries such as energy, aerospace, defense and security, telecommunications and information security, life sciences, chemical and pharmaceutical, material-processing equipment, electrical, semiconductor and computing industries, lasers and navigation. Therefore, estimating the effects of sanctions on industry level can be challenging. However, one of the main restrictions imposed by the international sanctions regards banks and financing projects in Russia. More specifically, the set of sanctions prohibits financing operations through equity, loans and other instruments to Russian banks, companies and individuals[4]. Consequently, those industries that rely more on external financing in their core activities might face stronger negative effects from sanctions.

The performance measures retrieved from the Eurostat are the Production Price Index (PPI), domestic PPI, foreign PPI, production, total turnover, domestic turnover, foreign turnover and productivity. All data are indexed with 2010 being the base year equal to 100. Table 1 in Appendix B shows the statistics for the EU. Production and Turnover

[3] Source: European Commission website (http://ec.europa.eu/trade/import-and-export-rules/export-from-eu/dual-use-controls/)
[4] Source: European External Action Service website (http://eeas.europa.eu/archives/docs/cfsp/sanctions/docs/measures_en.pdf)

present high variation while the PPI is more stable. The debt to surplus ratio is calculated as the ratio between debt and surplus ratio for all the non-financial corporations either public or private. Debt includes all the liabilities such as loans, securities and accounts payables. Gross operating surplus is calculated as the income before taking into account any charge such as interests, rent and payables. For instance, a company with a ratio of above 1, has a debt that is larger than its annual flow of gross operating surplus. This ratio is relevant as it proxies for the use of external debt/financing from banks and financial institutions in general. Therefore, a high ratio indicates that in a specific country and for a specific year, the industries use high level of debts to finance their operations. The highest debt to surplus ratio (i.e. LevCountry) is observed for Luxembourg (around 21.74%) with a ratio twice as high as the runner up and the lowest ratio is from Czech Republic (around 2.049%).

Another leverage measure considered is the debt to total capital ratio. This ratio, instead, is typically used to evaluate companies in corporate finance. It tells how much of a company's assets are financed through debt. Therefore, it is a proxy for bank financing as well. For this ratio, (i.e. LevIndustry), which is constant across time and country but varies across industries, the machinery and equipment industry presents the lowest ratio (15.22%) while the transport one the highest (57.74%).

USA

For the United States of America, I collect quarterly data from the U.S. Census Bureau, Bureau of Labor Statistics databases and the Federal Reserve Bank of St. Louis. For the US, there are 21 industries analyzed, including five[5] that are more exposed to the Russian market as they represent the key commodities exported to Russia in 2013. More specifically, the US exported to Russia USD 2.3 billion in machinery (e.g. boilers, nuclear reactors, machinery parts), 1.9 billion in vehicles and parts, 675 million in electrical equipment and 659 million in medical equipment (Moret et al. 2017). The US databases classify economic activities through the North American Industry Classification System. The data on the PPI index and total turnover span from the beginning of 2010 until the end of 2016. All data are in millions of US dollars. Thus, for each performance measure I have 588 observation

[5] There is no available data on dual-use goods.

equally split across the 21 different industries. Table 2 in Appendix B shows the statistics for the USA. The debt to surplus ratio spans from a minimum of 6.589% in 2013 to a maximum of 7.576% in 2010 across the entire period. The industry with the lowest debt to total capital ratio is the Pharmaceutical one (12.72%) while the one with the highest is the Transport (60.07%).

CANADA

For Canada, I collect quarterly data from the Canadian Industry Statistics and the Federal Reserve Bank of St. Louis websites. Canada uses the NAICS industry classification as well. The total quarterly observations are 588 for the performance measures PPI index and turnover spanning from the beginning of 2010 until the end of 2016. All data are in millions of US dollars. Table 3 in Appendix B shows the statistics for Canada. The debt to surplus and debt to total capital ratio are those of the US as there is no separate data available for Canada, and the two economies can be assumed to be similar in terms of capital structures.

AUSTRALIA

For Australia, I collect quarterly data from the Australian Bureau of Statistics website. Australia uses the Australian and New Zealand Standard Industrial Classification (ANZSIC) system to classify economic activities. The total observations are 588 for the PPI, while 448 for turnover since there are not all industries present their data completely. All data are in millions of US dollars. Table 4 in Appendix B shows the statistics for Australia. The debt to surplus ratio spans from 1.674% in 2012 to 2.522% in 2016 across the period. The debt to total capital ratio used is the Global one provided by Damodaran as there is not one specific for Australia. The pharmaceutical industry presents the lowest debt to total capital ratio (15.23%) while the transport one presents the highest (48.37%).

As explained before, I create a unique dataset aggregating the data from the US, Canada and Australia. The total dataset is composed by 1764 observations split among the three economies for the 21 industries. In order to aggregate, I matched the industries classification of the NAICS and the ANASIC. For aggregate statistics please refer to Table 5

of Appendix B. The lowest debt to surplus ratio is observed for Australia in 2012 (1.674%) while the highest is observed for the USA in 2010 (7.567%). For the debt to total capital ratio the highest value is observed for the pharmaceutical industry (12.72%) while the highest for the transport industry (60.07%) always in the US and Canada.

3.1.2 Methodology: Fixed Effects and Pooled OLS

I perform a pooled OLS regression for the two datasets with country and industry fixed effects and robust standard errors. Country fixed effects should account for time invariant characteristics of each country such as national culture, customs or geographical location. Industry fixed effects, instead, should account for aggregated shocks to each single industry such as a change in regulation or a new technology discovered. Year fixed effects should account for aggregated shocks to the economies in a specific year such as sovereign debt crisis in 2011 in the EU and consequential unconventional monetary policy adopted by the European Central Banks that might have affected companies' availability of financing and therefore their operations, costs and profitability. However, the year fixed effects would include also the impact of sanctions for the years after the sanctions have been imposed (i.e. 2015 and 2016). Therefore, I run the model with a time trend including a year variable.

My regression model aims at discovering the effects of the sanctions imposed by the European Union on Russia for the 28 sanctioning countries on the 6 most exposed industries among 29, and for Australia, the USA and Canada on the 5 most exposed industries among 21. Therefore, I want to test whether sanctions, and to which extent, affect sanctioning countries at an industry level. In other words, I investigate whether sanctions backfire. In order to perform this analysis, I estimate the following regression model:

$$Perfomance_{i,j,t} = Sanctions_t \; x \; Exposed_j + Sanctions_t + Exposed_j + Retaliation_t$$
$$+\delta_i + \delta_j + YEAR + \sum Controls + \varepsilon_{i,j,t}$$

$Performance_{i,j,t}$ is a measure of industry performance for country i, industry j and quarter t; I consider 29 industries for the EU and 21 for the other sanctioning countries (i.e. Australia, Canada, the USA). The measures are retrieved from statistical databases of governments. The Production Price Index (PPI) is an index constructed measuring the gross monthly change in the trading price of industrial products from the point of view of the

producers/manufacturers. Total output is calculated as the values of output at regular intervals (quarterly in my case). Total turnover corresponds to market sales to third parties and includes all other costs (e.g. transport and packaging) that are charged on the customer. Domestic and foreign turnover simply split total turnover according on the first destination of the good based on the residency of the third party purchasing the good. Finally, for the EU, I construct a productivity measure calculated as total output divided by working hours. The working hours represents the total number of hours employed to produce the output in the reference period. This ratio indicates how many hours are necessary to produce one unit of output. For the EU, all data are indexed to 2010 as a base year. For Australia, Canada and the US the data are in value of current US Dollars; therefore, they are deflated using the US Dollar quarterly CPI to obtain the real US Dollars. δ_i indicates country fixed effects, while δ_j industry fixed effects, $YEAR$ is the time trend.

To measure the effect of sanctions I construct a dummy variable $Sanctions_t$ equal to one when the sanctions are in place, which is from the second quarter of 2014 onwards, and zero otherwise. This dummy is then interacted with another dummy, $Exposed_j$, equal to one if an industry is highly exposed to sanctions to Russia (i.e. the food, pharmaceutical, machinery, electrical equipment, transports and capital goods industries) and zero otherwise.

$Retaliation_t$ is a dummy variable equal to one when the sanctions of Russia against the sanctioning countries are in place, starting from the fourth quarter of 2014, and zero otherwise; it is used to control for counter sanctions of Russia against the sanctioning countries that might affect the performance of the industries in particular of the food one as the Russia sanction are more specific and target specific products particularly in the food industry (e.g. meat, fish, diary…). In addition, other control variables that might affect the results are included, $\sum Controls$. They are: $GDP_{i,t}$, the quarterly GDP of country I in quarter t; and, $OilPrice_t$, the quarterly oil price of oil per barrel and it is used to control for production and transport costs.

I also construct other models in which the sanctions and exposure dummies are interacted with other variables to investigate other factors that might affect the results. First,

I collect industry capital structure data provided by Damodaran[6]. His database gathers data from companies across the world in order to compute financial ratios by industry and region (e.g. USA, Europe, and Global). With regards to the capital structure Damodaran provides debt to total capital ratio varying across industries and macro areas but not across time. I collect the ratios for each of the industry analyzed and split the industries in above and below median according to their ratio. To interact this industry leverage ratio with the other two variables I construct a dummy variable, *IndustryLev*, equal to one when the ratio is above median and zero otherwise.

Alternatively, I consider another measure of leverage, $LevCountry_{i,t}$, retrieved from the OECD database. The OECD provides with data over the aggregate debt to surplus ratio for all non-financial corporations by country and year but constant across industries. This leverage measure is lagged by one year. The ratio indicates how big the debt (e.g. loans) outstanding of the company is with respect to the annual flow of gross operating surplus. Again, this measure is interacted with the sanctions and exposed dummies.

For the EU, another variable is added: $Soviet_i$ is a dummy variable equal to 1 if a country was part of the USSR or particularly influenced by Russia (e.g. through political/military invasion; Warsaw pact).

A possible issue in my estimation is endogeneity. However, in my case, the Crimea crisis and the following sanctions imposed on Russia were unexpected and occurred in just a couple of months. Therefore, it is difficult to assume that the sanctions were anticipated by markets, in what is dubbed as a lead and lag event. In addition, since I include country and industry fixed effects in all the specifications, the time-invariant main effects such as *Exposed*, $IndustryLev_j$ and $Soviet_i$ drop due to collinearity. This does not occur for other variables such as $CountryLev_{i,t}$ since it is time variant.

[6] Source: Damodaran Database (http://pages.stern.nyu.edu/~adamodar/New_Home_Page/home.htm)

3.2 Macro Analysis

3.2.1 Data on FDI and Exports

To analyze the effect of sanctions to a wider extent I also investigate their effect on exports and foreign direct investments. I collect quarterly data on total exports of goods and exports by product from the International Trade Center (ITC) database[7]. The product classification used is the HS 2007 at the 2-digit level which splits among 95 different products. The data are available from the beginning of 2012 till the end of 2016 for all the European 28 member countries, Australia, Canada and the United States. Therefore, I have 58900 observations in total. I collect data on Foreign Direct Investments (FDIs) from the Central Bank of Russia (CBR) database. The CBR provides quarterly data on net FDIs (inflow minus outflow) by country (i.e. the EU 28 member states, Australia, Canada and the United States) from the beginning of 2010 till the 3rd quarter of 2016. In total, there are 837 observations. The summary statistics of these datasets are presented in Tables 6 and 7 in Appendix B.

3.2.2 Methodology: Fixed Effects and Pooled OLS

To perform the analysis, I build a gravity model. This model takes its name from the Newtonian law of gravitation and it was first introduced in the field of economics by Tinbergen (1962) to analyze bilateral trade flows. Since then, literature has greatly used and developed by international trade researchers[8]. The most common formulation is the one derived by Melitz (2003) and Chaney (2008). As Piermartini and Yotov (2016) explain, there are many issues that one faces when performing a gravity estimation performing a simple OLS regression model. First, zero trade flows do contain information that are not taken into account. To solve this issue literature has outlined two main ways. On the one hand, perform a two-stage selection process following Helpman et al. (2008). On the other hand, Silva and Tenreyro (2006) propose Poisson Pseudo Maximum Likelihood (PPML) estimator for gravity estimations. However, for both the exports and FDIs, the number of zeros in my dataset is relatively small accounting for less than one fourth of the total observations (e.g.

[7] ICT website: http://legacy.intracen.org/marketanalysis/Default.aspx

[8] See papers by Anderson & van Wincoop (2003), Baier & Bergstrand (2009), Head & Mayer (2013)

15,460 out of 58,900 for the exports). Secondly, heteroscedasticity in the data make OLS estimates inconsistent and biased (Santos et al., 2006); this issue can be solved using robust standard errors. Thirdly, the trade policy analyzed can be highly endogenous. As explained before, moving the sanctions dummy before and after the second quarter of 2014 can control for endogeneity.

Therefore, my regression model is a pooled OLS with fixed effects as follows:

$$Export_{i,j,t} = Sanctions_t x Exposed_j + Sanctions_t + Exposed_j + Retailation_t + GDP_{i,t} + GDP_{Russia,t} + Tariff_{i,t} + WTO_t + EERRussia_t + \delta_i + \delta_j + \varepsilon_{i,t}$$

$Export_{i,j,t}$ is the natural logarithm of export of country i to Russia (Russian import) for product j in quarter t. $Tariff_{i,j,t}$ is the tariff on imports imposed by Russia on country i for product j in quarter t. The tariff is defined as $Ln(1 + Tariff)$. WTO_t is a dummy variable equal to 1 when Russia becomes part of the World Trade Organization (since August 2012). I also analyze the effect on total FDI from each sanctioning country to Russia. Therefore, instead of exports I use FDI net flows by country and FDI inflow by economic activity. Country fixed effects, δ_i, should take into account traditional gravity variables such as distance between country i Russia, common language and population; while, product fixed effects, δ_j, should take into account product/industry specific shock such as change in regulation. The different model specifications include different interaction effects with industry leverage, country leverage and Russia strong relationship. Finally, as in the previous model, I run the regression using a time trend. In the results, I also comment what happens when time (year) fixed effects are used instead of a time trend.

4. Results

4.1 Industry Performance Analysis

In this section I present and discuss the results from the industry performance analysis. Each subsection presents the results for a different specification of the model.

Model 1 – Sanctions-Exposed interaction

Table 1 shows the results for the basic model in Europe. In this model, the *sanctions* dummy is interacted with the *exposed* dummy equal to one when the industry is more likely to be impacted by the sanctions. For Europe, these industries are: food, pharmaceutical, machinery, electrical equipment, transports and capital goods. Each column uses a different industry performance measure as a dependent variable. All models include country fixed effects, industry fixed effects, a time trend (yearly) and robust standard errors; the period considered spans from the first quarter of 2010 till the last of 2016. In general, the sanctions have a negative effect on the performance of the industries of the European Union economies. However, the coefficient of the interaction term of the sanctions with the exposed dummy is positive. Therefore, we can interpret the results as follows: -3.086 is the estimated effect of sanctions when the industry is not exposed on the turnover in index points. Instead, when the industry is exposed, the total effect becomes positive, 9.224 (-3.086 + 12.31). This means that probably the industries that are mostly exposed were able to respond promptly to the sanctions either finding a way to maintain their business in Russia or finding new clients in other countries. This phenomenon is observable and confirmed by the foreign turnover as well. In other words, such industries were either able to divert their trade towards other destinations in replacement of Russia or to find new ways of trading with Russia without breaking the sanctions regulations.

Table 1 – Model 1 Europe

The table reports the results from regressing different quarterly performance measures on the interaction of a sanctions and exposed dummies for the 28 European Union member states for the 2010-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Exposed dummy equals one when the industry considered is more likely to be exposed to the sanction framework. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; GDP is the quarterly gross domestic product form each sanctioning country; Oil Price is the price per barrel of oil. All regressions further include country and industry fixed effects and a time trend. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	PPI	PPI_Dom	PPI_For	Production	Turnover	Dom_Turn	For_Turn	Productivity
Sanc_Exp	0.782***	0.445*	0.657**	9.973***	12.31***	9.980***	6.357**	0.0455***
	(0.241)	(0.254)	(0.273)	(0.996)	(1.045)	(1.511)	(2.871)	(0.00886)
Sanctions	-2.410***	-2.091***	-2.541***	-0.782	-3.086***	0.389	7.105	0.0319***
	(0.293)	(0.279)	(0.369)	(0.968)	(1.023)	(1.403)	(11.31)	(0.00791)
Retaliation	3.215***	2.738***	3.696***	6.335***	10.80***	12.37***	4.824	0.0269**
	(0.495)	(0.483)	(0.584)	(1.625)	(1.671)	(2.178)	(9.646)	(0.0131)
GDP_Bill	0.000546	0.00146***	-0.00704*	0.0840***	0.0851***	0.092***	0.00303	0.000260***
	(3.67e-06)	(3.60e-06)	(3.69e-06)	(7.27e-06)	(8.14e-06)	(9.63e-06)	(3.31e-05)	(6.07e-08)
OilPrice	0.110***	0.0988***	0.114***	0.0415	0.165***	0.195***	0.315***	0.000472**
	(0.00835)	(0.00802)	(0.00965)	(0.0256)	(0.0265)	(0.0337)	(0.0760)	(0.000207)
Constant	-2.746***	-2.621***	-2.748***	-838.0**	-2.963***	550.6	-10.587***	-10.60***
	(126.0)	(120.4)	(153.4)	(395.1)	(414.3)	(529.7)	(933.6)	(3.210)
Observations	15,633	15,432	14,740	14,893	14,814	13,232	13,018	14,338
R-squared	0.256	0.270	0.227	0.269	0.277	0.242	0.083	0.149
Fixed Effects	i,j	i,j	i,j	i,j	i,j	i,j	i,j	i,j
Time	Time	Time	Time	Time	Time	Time	Time	Time
Variable	Trend	Trend	Trend	Trend	Trend	Trend	Trend	Trend

Table 2 shows the results for Europe but the Production Price Index is used as a control instead of as a performance measure. In general, the results do not change. Table 3 shows the results for the aggregate datasets of Australia, Canada and the USA. The third column uses the PPI as a control variable. The only performance measures available for this dataset are the total turnover and the PPI. For these countries, there is little or no effect. Column 2 shows that an exposed industry during the sanctions increased on average its turnover by just 60 thousand real US Dollars. This effect fades away when the PPI is used as a control.

Table 2 – Model 1 Europe with PPI as a control

The table reports the results from regressing different quarterly performance measures on the interaction of a sanctions and exposed dummies for the 28 European Union member states for the 2010-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Exposed dummy equals one when the industry considered is more likely to be exposed to the sanction framework. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; PPI is the producer price index; GDP is the quarterly gross domestic product form each sanctioning country; Oil Price is the price per barrel of oil. All regressions further include country and industry fixed effects and a time trend. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Production	Turnover	Dom_Turn	For_Turn	Productivity
Sanc_Exp	9.928***	12.21***	8.800***	5.503*	0.0484***
	(0.958)	(1.065)	(1.107)	(3.109)	(0.00881)
Sanctions	-0.948	-0.996	1.916	11.56	0.0257***
	(0.920)	(1.050)	(1.185)	(13.18)	(0.00784)
Retaliation	6.102***	7.912***	9.831***	-0.463	0.0337***
	(1.539)	(1.701)	(1.923)	(11.17)	(0.0129)
PPI	-0.0678**	0.727***	0.548***	0.755***	-0.00276***
	(0.0333)	(0.0425)	(0.0455)	(0.0964)	(0.000311)
GDP_Bill	0.0819***	0.083***	0.084***	0.0195	0.000268***
	(6.65e-06)	(7.98e-06)	(8.32e-06)	(3.69e-05)	(5.78e-08)
OilPrice	0.0233	0.0438	0.0766**	0.200**	0.000663***
	(0.0249)	(0.0273)	(0.0300)	(0.0820)	(0.000207)
Constant	-417.4	173.5	3.681***	-7.783***	-16.12***
	(392.8)	(427.9)	(479.3)	(1,058)	(3.334)
Observations	13,042	13,040	11,597	10,959	12,640
Fixed Effects	i,j	i,j	i,j	i,j	i,j
Time	Time	Time	Time	Time	Time
Variable	Trend	Trend	Trend	Trend	Trend

Table 3 – Model 1 Australia, Canada, USA

The table reports the results from regressing different quarterly performance measures on the interaction of a sanctions and exposed dummies for the Australia, Canada and the USA for the 2010-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Exposed dummy equals one when the industry considered is more likely to be exposed to the sanction framework. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; PPI is the producer price index; GDP is the quarterly gross domestic product form each sanctioning country; Oil Price is the price per barrel of oil. All regressions further include country and industry fixed effects and a time trend. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)
VARIABLES	PPI	Turnover	Turnover
Sanctions_Exposed	8.230	60.10*	27.76
	(5.636)	(35.77)	(39.28)
Sanctions	-2.541	-7.320	1.255
	(4.520)	(39.57)	(36.05)
Retaliation	3.490	24.78	13.78
	(7.436)	(61.08)	(58.16)
PPI	/	/	3.104***
			(0.409)
GDP Bill	-0.00834	-0.00232	-0.00138
	(1.89e-06)	(1.39e-05)	(1.33e-05)
OilPrice	0.154	1.212	0.705
	(0.111)	(0.891)	(0.850)
Constant	-3,447*	464.7	11,966
	(1,898)	(15,661)	(14,831)
Observations	1,708	1,596	1,568
R-squared	0.553	0.613	0.668
Fixed Effects	i,j	i,j	i,j
Time	Time	Time	Time
Variable	Trend	Trend	Trend

Model 2 – Sanctions-Exposed-Industry Leverage interaction

Table 4 shows the results for the additional effect of industry leverage in Europe. In this model, the *sanctions* dummy is interacted with the *exposed* dummy and the *Leverage Industry* dummy equal to one when the industry debt to total capital ratio is above the median of all the industries considered. As in the previous model the results show a total positive effect of the sanctions for the most exposed and highly leveraged industries in Europe in terms of Production (0.569 + 9.960), Turnover (-2.815 + 9.009) and Productivity (0.0401 + 0.0415). The only negative effect is observed for the foreign PPI (-2.855 - 1.118). When using the PPI as a control, the results do not change (not shown for brevity). Table 5 shows the results for the Australia, Canada and the USA aggregate dataset. For these countries, there is no significant effect of the sanctions is observed.

Table 4 – Model 2 Europe

The table reports the results from regressing different quarterly performance measures on the interaction of a sanctions, exposed and industry leverage dummies for the 28 European Union member states for the 2010-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Exposed dummy equals one when the industry considered is more likely to be exposed to the sanction framework. Industry Leverage is a dummy equal to one when an industry debt to total capital ratio is above the median of the entire distribution. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; GDP is the quarterly gross domestic product form each sanctioning country; Oil Price is the price per barrel of oil. All regressions further include country and industry fixed effects and a time trend. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	PPI	PPI_Dom	PPI_For	Production	Turnover	Dom_Turn	For_Turn	Productivity
San_Exp_IndLev	-0.485	-0.0882	-1.118**	9.960***	9.009***	9.226***	-4.734	0.0415**
	(0.473)	(0.478)	(0.539)	(2.054)	(2.145)	(3.375)	(5.527)	(0.0181)
Sanctions	-2.580***	-2.282***	-2.855***	0.569	-2.815**	0.735	-0.745	0.0401***
	(0.348)	(0.340)	(0.433)	(1.090)	(1.105)	(1.433)	(9.042)	(0.00921)
Retaliation	3.215***	2.738***	3.695***	6.335***	10.80***	12.38***	4.837	0.0269**
	(0.495)	(0.483)	(0.584)	(1.626)	(1.671)	(2.179)	(9.640)	(0.0131)
GDP_Bill	0.00546	0.0146***	-0.007*	0.0839***	0.0846***	0.0923***	0.00119	0.000261***
	(3.67e-06)	(3.60e-06)	(3.68e-06)	(7.26e-06)	(8.12e-06)	(9.59e-06)	(3.34e-05)	(6.08e-08)
OilPrice	0.110***	0.0988***	0.114***	0.0416	0.165***	0.195***	0.316***	0.000471**
	(0.00835)	(0.00802)	(0.00964)	(0.0255)	(0.0265)	(0.0336)	(0.0761)	(0.000207)
San_Exp	1.009***	0.536	1.145***	5.882***	8.817***	6.291***	10.25***	0.0278**
	(0.347)	(0.384)	(0.388)	(1.295)	(1.317)	(1.523)	(1.904)	(0.0118)
Sanc_IndLev	0.328	0.367	0.631	-2.527**	-0.501	-0.641	14.94***	-0.0159*
	(0.375)	(0.353)	(0.442)	(1.044)	(1.058)	(1.288)	(4.971)	(0.00852)
Constant	-2.747***	-2.622***	-2.749***	-848.6**	-2.975***	542.6	-10.598***	-10.65***
	(126.0)	(120.4)	(153.4)	(395.1)	(414.1)	(529.8)	(932.1)	(3.211)
Observations	15,633	15,432	14,740	14,893	14,814	13,232	13,018	14,338
R-squared	0.256	0.270	0.228	0.270	0.278	0.243	0.084	0.149
Fixed Effects	i,j	i,j	i,j	i,j	i,j	i,j	i,j	i,j
Time	Time	Time	Time	Time	Time	Time	Time	Time
Variable	Trend	Trend	Trend	Trend	Trend	Trend	Trend	Trend

Table 5 – Model 2 Australia, Canada, USA

The table reports the results from regressing different quarterly performance measures on the interaction of a sanctions, exposed and industry leverage dummies for Australia, Canada and the USA for the 2010-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Exposed dummy equals one when the industry considered is more likely to be exposed to the sanction framework. Industry Leverage is a dummy equal to one when an industry debt to total capital ratio is above the median of the entire distribution. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; PPI is the producer price index; GDP is the quarterly gross domestic product form each sanctioning country; Oil Price is the price per barrel of oil. All regressions further include country and industry fixed effects and a time trend. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)
VARIABLES	PPI	Turnover	Turnover
Sanc_Exp_IndLev	-5.203	52.53	81.16
	(10.68)	(115.3)	(133.7)
Sanctions	-4.740	-48.72	-29.86
	(5.539)	(59.81)	(51.28)
Retaliation	3.493	24.69	13.72
	(7.442)	(61.09)	(58.16)
PPI	/	/	3.100***
			(0.405)
GDP Bill	-0.000108	-0.00162	-0.000866
	(1.89e-06)	(1.39e-05)	(1.33e-05)
OilPrice	0.154	1.211	0.705
	(0.111)	(0.890)	(0.849)
Sanctions_Exposed	10.75	74.30	28.70
	(7.297)	(51.79)	(45.81)
Sanctions_IndLev	3.616	64.97	49.46
	(4.292)	(46.19)	(39.17)
Constant	-3,474*	354.7	11,833
	(1,899)	(15,683)	(14,864)
Observations	1,708	1,596	1,568
R-squared	0.553	0.615	0.669
Fixed Effects	i,j	i,j	i,j
Time Variable	Time Trend	Time Trend	Time Trend

Model 3 – Sanctions-Exposed- Country Leverage interaction

Table 6 presents the results for the additional effect for country leverage in Europe. In this model, the *sanctions* dummy is interacted with the *exposed* dummy and the *Country Leverage* variable. As explained in Section 3, this variable indicates how big the debt outstanding is compared to the annual flow of gross operating surplus. This variable is centered around its mean. Centering a variable consists in demeaning each observation (i.e. country leverage ratio) from its cross-sectional average. In fact, Balli & Sørensen (2013) suggest that centering interaction terms in panel data provides a hedge against spurious results. With centering, basically one looks at the marginal effect of the sanctions when a country's leverage ratio is at its mean value (and not at zero like in the case without centering). The results show that when the level of debt over surplus across all the industries increases, exposed industries are negatively impacted by the sanctions when looking at their production, total turnover and domestic turnover. The reason might be that industries that generally rely more on debt for their operations face issues in operating in Russia due to the sanctions. More specifically, an increase in the use of debt over surplus by 1% point decreases the Turnover by 15.488 (8.503 + 1.611 + 5.374) index points. In fact, as the sanctions impose limits on financial operations in Russia to banks, companies might find more difficult to raise debt for projects in Russia.

However, this result is in contrast with the result of Model 2 in which industry leverage is used. There are three fundamental differences between the two measures. First of all, the industry leverage is retrieved from Damodaran who looks at the level of debt over capital and not over the annual flow of gross operating surplus. Second, the industry leverage measure varies by industry only and not by time or country; while the debt to surplus ratio varies by country and by year. Lastly, the measure by Damodaran is calculated using all listed companies in each industry. The debt to surplus ratio, instead, includes all private and public non-financial companies. Also in this case, PPI as a control does not affect the results.

Table 7 displays the results for the aggregate data set of Australia, Canada and the USA, where the same negative effect is observed for the Turnover both with and without the PPI as a control.

Table 6 – Model 3 Europe

The table reports the results from regressing different quarterly performance measures on the interaction of a sanctions, exposed dummies with a country leverage variable for the 28 European Union member states for the 2010-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Exposed dummy equals one when the industry considered is more likely to be exposed to the sanction framework. Country Leverage is calculated as debt over annual flow of gross operating surplus. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; GDP is the quarterly gross domestic product form each sanctioning country; Oil Price is the price per barrel of oil; and, all the other interaction combinations. All regressions further include country and industry fixed effects and a time trend. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	PPI	PPI_Dom	PPI_For	Production	Turnover	Dom_Turn	For_Turn	Productivity
Sanc_Exp_CounLev	1.979***	2.559***	0.890	-4.587*	-8.503***	-11.09**	7.452	-0.0159
	(0.689)	(0.707)	(0.869)	(2.780)	(2.734)	(4.351)	(10.26)	(0.0220)
Sanctions	-2.335***	-1.925***	-2.546***	0.0663	-1.611	1.462	11.34	0.0420***
	(0.315)	(0.295)	(0.398)	(0.954)	(0.992)	(1.326)	(13.44)	(0.00805)
CountryLev	-0.434	-0.499*	-0.553	-5.346***	-5.374***	-7.878***	-8.135***	-0.0132*
	(0.365)	(0.283)	(0.479)	(0.817)	(0.865)	(1.144)	(2.183)	(0.00714)
Retaliation	3.201***	2.668***	3.692***	5.318***	9.672***	9.464***	3.544	0.0161
	(0.539)	(0.513)	(0.636)	(1.659)	(1.659)	(2.110)	(11.51)	(0.0136)
GDP_Bill	0.00579	0.0152***	-0.06.51*	0.0648***	0.0626***	0.0787***	-0.0477	0.000137**
	(3.2e-06)	(3.6e-06)	(3.8e-06)	(7e-06)	(7.9e-06)	(9.7e-06)	(4.1e-05)	(5.8e-08)
OilPrice	0.104***	0.0919***	0.108***	0.00942	0.135***	0.100***	0.346***	0.000299
	(0.00936)	(0.00884)	(0.0107)	(0.0264)	(0.0264)	(0.0329)	(0.0860)	(0.000216)
Sanc_Exp	1.093***	0.471	1.273***	6.251***	7.188***	4.147***	3.397	0.0257***
	(0.270)	(0.301)	(0.298)	(0.923)	(0.900)	(1.203)	(2.522)	(0.00820)
Sanc_CounLev	-0.795	-0.694	-1.509*	8.267***	11.36***	12.29***	1.970	0.0427**
	(0.689)	(0.612)	(0.885)	(2.002)	(2.070)	(3.113)	(5.973)	(0.0173)
Exp_CounLev	0.543	0.250	1.109**	-3.452***	-2.232	-2.032	-0.751	-0.0286***
	(0.384)	(0.324)	(0.481)	(1.338)	(1.391)	(2.064)	(2.138)	(0.0103)
Constant	-2,526***	-2,432***	-2,443***	1,288***	-757.2*	2,883***	-6,007***	-0.808
	(136.4)	(127.5)	(167.4)	(394.4)	(401.7)	(502.5)	(1,052)	(3.260)
Observations	12,613	12,497	11,948	12,593	12,458	10,904	10,774	12,038
R-squared	0.262	0.288	0.205	0.247	0.256	0.222	0.069	0.120
Fixed Effects	i,j	i,j	i,j	i,j	i,j	i,j	i,j	i,j
Time	Time	Time	Time	Time	Time	Time	Time	Time
Variable	Trend	Trend	Trend	Trend	Trend	Trend	Trend	Trend

Table 7 – Model 3 Australia, Canada, USA

The table reports the results from regressing different quarterly performance measures on the interaction of a sanctions, exposed dummies with a country leverage variable for Australia, Canada and the USA for the 2010-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Exposed dummy equals one when the industry considered is more likely to be exposed to the sanction framework. Country Leverage is calculated as debt over annual flow of gross operating surplus. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; PPI is the producer price index; GDP is the quarterly gross domestic product form each sanctioning country; Oil Price is the price per barrel of oil; and, all the other interaction combinations. All regressions further include country and industry fixed effects and a time trend. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)
VARIABLES	PPI	Turnover	Turnover
Sanc_Exp_CounLev	-16.96	-515.2***	-642.1***
	(19.14)	(121.7)	(130.5)
Sanctions	1.123	9.080	3.529
	(5.178)	(46.80)	(42.76)
LevCountry	-8.126	-54.49	-39.33
	(5.128)	(48.41)	(44.01)
Retaliation	1.137	12.99	8.591
	(7.685)	(62.91)	(59.71)
PPI	/	/	3.148***
			(0.408)
GDP	-5.22e-07	-3.28e-06	-1.29e-06
	(2.01e-06)	(1.45e-05)	(1.41e-05)
OilPrice	0.0996	0.952	0.587
	(0.131)	(1.057)	(1.007)
Sanctions_Exposed	9.000	73.10**	43.48
	(5.938)	(36.11)	(39.54)
Sanctions_CountryLev	14.86	173.9*	170.2*
	(11.10)	(99.97)	(90.85)
Exposed_CountryLev	2.873	78.25	102.4*
	(8.654)	(52.96)	(57.51)
Observations	1,708	1,596	1,568
R-squared	0.554	0.617	0.673
Fixed Effects	i,j	i,j	i,j
Time	Time	Time	Time
Variable	Trend	Trend	Trend

Model 4 – Sanctions-Exposed-Soviet

Model 4 investigates the effect of sanctions for those countries that historically have been more integrated with Russia, both from a political and an economical point of view. In order to do so, the *sanctions* and *exposed* dummies are interacted with the *soviet* dummy variable, equal to one when a country was under Russian influence in the past. These countries are those that were either part of the Soviet Union (USSR), part of the Warsaw Pact or invaded/influenced by Russia. Obviously, these countries are part of the European data set only and are: Bulgaria, Croatia, Czech Republic, Estonia, Finland, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia. Table 8 displays the main results. We can note how the effect of sanctions for exposed industries in a soviet country is positive for production (1.591 = 8.8245 - 6.654) and productivity (0.0446=0.0587+0.0387); while negative for Turnover (-1.56 = 7.872 - 9.432). A possible explanation for the positive effect is that these countries have stronger economic and political relationship compared to other countries. Therefore, such countries have become more important for Russia due to the sanctions since they were already closer in terms of political and economic relationship. Russia might have faced less supply of goods and services from other countries and markets due to the sanctions. Therefore, this short in supply might be replaced by these countries given their closer economic ties. However, this effect is compensated by a negative effect on turnover and not observable for the foreign turnover; therefore, it is difficult to assess whether this is the case. When PPI is used as a control the results hold.

Table 8 – Model 4 Europe

The table reports the results from regressing different quarterly performance measures on the interaction of a sanctions, exposed dummies with a soviet dummy for the 28 European Union member states for the 2010-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Exposed dummy equals one when the industry considered is more likely to be exposed to the sanction framework; Soviet dummy equals one when a country has been historically influenced either politically or economically by Russia. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; GDP is the quarterly gross domestic product form each sanctioning country; Oil Price is the price per barrel of oil; and, all the other interaction combinations. All regressions further include country and industry fixed effects and a time trend. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	PPI	PPI_Dom	PPI_For	Production	Turnover	Dom_Turn	For_Turn	Productivity
Sanc_Exp_Soviet	-0.00647	1.071*	-1.047*	8.245***	7.872***	0.897	-3.660	0.0387**
	(0.513)	(0.559)	(0.589)	(2.179)	(2.246)	(3.154)	(6.016)	(0.0195)
Sanctions	-2.838***	-2.261***	-2.940***	-6.654***	-9.432***	-5.927***	-7.409	0.00587
	(0.326)	(0.300)	(0.403)	(0.955)	(1.041)	(1.419)	(8.896)	(0.00836)
Retaliation	3.221***	2.741***	3.699***	6.462***	10.93***	12.46***	5.038	0.0275**
	(0.494)	(0.482)	(0.583)	(1.592)	(1.637)	(2.149)	(9.605)	(0.0130)
GDP_Bill	0.0037	0.01.35***	-0.00836**	0.0497***	0.0493***	0.0665***	-0.0539	0.00011*
	(3.7e-06)	(3.66e-06)	(3.67e-06)	(6.66e-06)	(7.74e-06)	(9.42e-06)	(3.95e-05)	(5.74e-08)
OilPrice	0.111***	0.0994***	0.115***	0.0617**	0.185***	0.210***	0.349***	0.000561***
	(0.00834)	(0.00802)	(0.00963)	(0.0250)	(0.0259)	(0.0332)	(0.0785)	(0.000205)
Exp_Soviet	0.907***	0.834***	-1.105***	1.469	2.249**	5.449***	-1.872	-0.0174**
	(0.267)	(0.264)	(0.317)	(1.020)	(1.060)	(1.434)	(1.690)	(0.00798)
Sanc_Soviet	1.124***	0.458	1.089**	14.24***	15.02***	13.64***	31.75***	0.0625***
	(0.388)	(0.373)	(0.470)	(1.134)	(1.127)	(1.347)	(5.881)	(0.00891)
Sanc_Exp	0.807***	0.0686	1.053***	6.910***	9.289***	9.779***	8.385***	0.0311***
	(0.288)	(0.288)	(0.320)	(0.822)	(0.888)	(1.333)	(1.436)	(0.00842)
Constant	-2,746***	-2,620***	-2,748***	-822.0**	-2,951***	528.0	-10,636***	-10.56***
	(125.9)	(120.3)	(153.3)	(389.4)	(408.6)	(525.3)	(926.7)	(3.191)
Observations	15,633	15,432	14,740	14,893	14,814	13,232	13,018	14,338
R-squared	0.257	0.271	0.229	0.288	0.297	0.251	0.088	0.156
Fixed Effects	i,j	i,j	i,j	i,j	i,j	i,j	i,j	i,j
Time	Time	Time	Time	Time	Time	Time	Time	Time
Variable	Trend	Trend	Trend	Trend	Trend	Trend	Trend	Trend

4.2 Macro Analysis: Exports

In this section, I present and discuss the results from the macro analysis of the exports to Russia. Each subsection presents the results for a different specification of the model.

Model 1 – Sanctions-Exposed Interaction

In this model, the *sanctions* dummy is interacted with the *exposed* dummy and is equal to one when the product is part of an industry that is more likely to be affected by the sanctions. Table 9 shows the results for the basic model using exports by product. Column one uses a time trend, while column 2 uses year fixed effects. However, the results are the same. In general, we can see that the sanctions for the exposed products (and industries) bring to a decline in the value of export of 27.58% (-0.305 + 0.0292). This is significant at the 1% level.

Table 9 – Model 1 Exports

The table reports the results from regressing then natural logarithm of the value of quarterly exports by product and country on the interaction of a sanctions dummy and an exposed dummy for the 28 European Union member states, Australia, Canada and the USA for the 2012-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Exposed dummy equals one when the industry considered is more likely to be exposed to the sanction framework. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies. GDP is the quarterly gross domestic product form each sanctioning country; GDP Russia is the quarterly gross domestic product of Russia; Tariff is the natural logarithm of one plus the tariff applied to each product and country; EER Russia is effective exchange of the Russian Ruble. All regressions further include country and industry fixed effects. Column 1 uses a time trend; while, column 2 year fixed effects. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)
VARIABLES	Exports	Exports
Sanctions_Exposed	-0.305***	-0.305***
	(0.0423)	(0.0423)
Sanctions	0.0292	/
	(0.0402)	
Retaliation	-0.232***	-0.162**
	(0.0610)	(0.0665)
LnGDP	0.487***	0.346**
	(0.154)	(0.160)
LnGDPRussia	0.785***	0.780***
	(0.134)	(0.136)
TariffS	-0.387***	-0.390***
	(0.0549)	(0.0551)
WTO	0.0569	0.0467
	(0.0349)	(0.0473)
EERRussia	0.00622***	0.00469**
	(0.00219)	(0.00230)
Constant	159.9***	-22.20***
	(35.88)	(3.146)
Observations	42,267	42,267
R-squared	0.609	0.609
Fixed Effects	i,j	i,j
Time Variable	Time Trend	Time FE

Model 2 – Sanctions-Exposed-Industry Leverage Interaction

Table 10 shows the results for the additional effect of industry leverage. In this model, the *sanctions* dummy is interacted with the *exposed* dummy and the *Leverage Industry* dummy and is equal to one when the industry is debt to total capital ratio is above the median of all the industries considered. Column 1 uses a time trend, while column 2 uses year fixed effects. The results show, that the value of exports of products of highly leveraged exposed industries during the sanctions increase by 24.5% (0.00196 + 0.243).

Table 10 – Model 2 Exports

The table reports the results from regressing then natural logarithm of the value of quarterly exports by product and country on the interaction of a sanctions, exposed and industry leverage dummies for the 28 European Union member states, Australia, Canada and the USA for the 2012-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Exposed dummy equals one when the industry considered is more likely to be exposed to the sanction framework. Industry Leverage is a dummy equal to one when an industry debt to total capital ratio is above the median of the entire distribution. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; GDP is the quarterly gross domestic product form each sanctioning country; GDP Russia is the quarterly gross domestic product of Russia; Tariff is the natural logarithm of one plus the tariff applied to each product and country; EER Russia is effective exchange of the Russian Ruble; and, all the other interaction combinations. All regressions further include country and industry fixed effects. Column 1 uses a time trend; while, column 2 year fixed effects. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)
VARIABLES	Exports	Exports
Sanc_Exp_IndLev	0.243*	0.244*
	(0.126)	(0.126)
Sanctions	0.00196	/
	(0.0473)	
Retaliation	-0.233***	-0.163**
	(0.0610)	(0.0665)
LnGDP	0.486***	0.344**
	(0.154)	(0.160)
LnGDPRussia	0.786***	0.781***
	(0.134)	(0.136)
TariffS	-0.391***	-0.395***
	(0.0549)	(0.0551)
WTO	0.0571	0.0467
	(0.0349)	(0.0473)
EERRussia	0.00621***	0.00467**
	(0.00219)	(0.00230)
Sanctions_Exposed	-0.312***	-0.312***
	(0.0509)	(0.0509)
Sanctions_IndLev	0.0453	0.0457
	(0.0406)	(0.0406)
Constant	167.2***	-15.53***
	(35.90)	(3.150)
Observations	42,267	42,267
R-squared	0.609	0.609
Fixed Effects	i,j	i,j
Time Variable	Time Trend	Time FE

Model 3 – Sanctions-Exposed-Country Leverage interaction

Table 11 shows the results for the additional effect of industry leverage at a country level. In this model, the *sanctions* dummy is interacted with the *exposed* dummy and the *Country Leverage* variable (centered around its mean). This variable indicates how big is the debt outstanding compared to the annual flow of gross operating surplus. The results show that for exposed industries when the general level of industry debt increases by 1 percentage point the value of exports increases by 0.975% (0.935 + 0.0402), on average.

Table 11 – Model 3 Exports

The table reports the results from regressing then natural logarithm of the value of quarterly exports by product and country on the interaction of a sanctions, exposed dummies with a country leverage variable for the 28 European Union member states, Australia, Canada and the USA for the 2012-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Exposed dummy equals one when the industry considered is more likely to be exposed to the sanction framework; Country Leverage is calculated as debt over annual flow of gross operating surplus. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; GDP is the quarterly gross domestic product form each sanctioning country; GDP Russia is the quarterly gross domestic product of Russia; Tariff is the natural logarithm of one plus the tariff applied to each product and country; EER Russia is effective exchange of the Russian Ruble; and, all the other interaction combinations. All regressions further include country and industry fixed effects. Column 1 uses a time trend; while, column 2 year fixed effects. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)
VARIABLES	Exports	Exports
Sanctions_Exposed_CounLev	0.935***	0.936***
	(0.144)	(0.144)
Sanctions	0.0402	/
	(0.0427)	
LevCountry	0.109*	0.101*
	(0.0564)	(0.0577)
Retaliation	-0.192***	-0.141**
	(0.0648)	(0.0700)
LnGDP	0.598***	0.452**
	(0.180)	(0.190)
LnGDPRussia	0.752***	0.756***
	(0.137)	(0.140)
TariffS	-0.442***	-0.446***
	(0.0611)	(0.0614)
WTO	0.0562	0.0401
	(0.0371)	(0.0499)
EERRussia	0.00704***	0.00582**
	(0.00231)	(0.00241)
Sanctions_Exposed	-0.334***	-0.334***
	(0.0459)	(0.0459)
Sanctions_CountryLev	-0.360***	-0.322***
	(0.0955)	(0.0981)
Exposd_CountryLev	-0.555***	-0.556***
	(0.0942)	(0.0943)
Constant	181.8***	-24.38***
	(38.02)	(3.745)
Observations	36,805	36,805
R-squared	0.626	0.626
Fixed Effects	i,j	i,j
Time Variable	Time Trend	Time FE

Model 4 – Sanctions-Exposed-Soviet interaction

This model looks at the effect of the sanctions on those countries that have been historically more integrated with Russia from an economic and/or political point of view. However, as Table 12 shows, we do not observe any effect on these 11 countries. Therefore, the sanctions do not affect their exports to Russia.

Table 12 – Model 4 Exports

The table reports the results from regressing then natural logarithm of the value of quarterly exports by product and country on the interaction of a sanctions, exposed dummies with a soviet dummy for the 28 European Union member states, Australia, Canada and the USA for the 2012-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Exposed dummy equals one when the industry considered is more likely to be exposed to the sanction framework; Soviet dummy equals one when a country has been historically influenced either politically or economically by Russia. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; GDP is the quarterly gross domestic product form each sanctioning country; GDP Russia is the quarterly gross domestic product of Russia; Tariff is the natural logarithm of one plus the tariff applied to each product and country; EER Russia is effective exchange of the Russian Ruble; and, all the other interaction combinations. All regressions further include country and industry fixed effects. Column 1 uses a time trend; while, column 2 year fixed effects. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)
VARIABLES	Exports	Exports
Sanctions_Exposed_Soviet	-0.0937	-0.0935
	(0.0859)	(0.0859)
Sanctions	0.00870	/
	(0.0431)	
Retaliation	-0.232***	-0.162**
	(0.0610)	(0.0665)
LnGDP	0.488***	0.346**
	(0.154)	(0.160)
LnGDPRussia	0.785***	0.781***
	(0.134)	(0.136)
TariffS	-0.389***	-0.393***
	(0.0549)	(0.0551)
WTO	0.0570	0.0467
	(0.0349)	(0.0473)
EERRussia	0.00622***	0.00468**
	(0.00219)	(0.00230)
Exposed_Soviet	-0.126**	-0.126**
	(0.0623)	(0.0623)
Sanctions_Soviet	0.0563	0.0556
	(0.0409)	(0.0409)
Sanctions_Exposed	-0.271***	-0.271***
	(0.0528)	(0.0528)
Constant	160.1***	-22.23***
	(35.86)	(3.147)
Observations	42,267	42,267
R-squared	0.609	0.609
Fixed Effects	i,j	i,j
Time Variable	Time Trend	Time FE

4.3 Macro Analysis: Foreign Direct Investments

Table 13 displays the results for the foreign direct investments. In this case, we do not observe any effect of sanctions.

Model 1 – Sanctions Effect

Table 13 – Basic Model FDI

The table reports the results from regressing then natural logarithm of the value of quarterly Foreign Direct Investments on a sanction dummy for the 28 European Union member states, Australia, Canada and the USA for the 2010-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; GDP is the quarterly gross domestic product form each sanctioning country; GDP Russia is the quarterly gross domestic product of Russia; WTO is a dummy variable equal to one when Russia is part of the World Trade Organization from the last quarter of 2012. All regressions further include country fixed effetcs. Column 1 uses a time trend; while, column 2 year fixed effects. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)
VARIABLES	LnFDI	LnFDI
Sanction	0.0800	0.408
	(0.207)	(0.264)
Retaliation	-0.422*	-0.206
	(0.223)	(0.388)
LnGDP	0.996	0.963
	(0.723)	(0.760)
LnGDPRussia	-0.0279	-0.607
	(0.510)	(0.663)
WTO	0.0715	0.357
	(0.228)	(0.307)
Constant	15.45	-0.774
	(170.1)	(16.14)
Observations	611	611
R-squared	0.824	0.825
Fixed Effects	i,j	i,j
Time Variable	Time Trend	Time FE

Model 2 – Sanctions-Country Leverage Interaction

This model investigates the effect of sanctions and the general level of debt financing across industries on foreign direct investments. The results show that an increase in 1 percentage point in the general level of debt over surplus across industries in one country brings to an increase in FDI of 0.723% (0.857 – 0.134). This is significant at the 1% level. In general, we can see that the effect of sanctions is positive when the country leverage equals zero; specifically, the sanctions increase FDI by 0.857%, significant at the 1% level.

Table 14 – Model 3 FDI

The table reports the results from regressing then natural logarithm of the value of quarterly Foreign Direct Investments on a sanction dummy interacted with the country leverage variable for the 28 European Union member states, Australia, Canada and the USA for the 2010-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Country Leverage is calculated as debt over annual flow of gross operating surplus. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; GDP is the quarterly gross domestic product form each sanctioning country; GDP Russia is the quarterly gross domestic product of Russia; WTO is a dummy variable equal to one when Russia is part of the World Trade Organization from the last quarter of 2012. All regressions further include country fixed effects. Column 1 uses a time trend; while, column 2 year fixed effects. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

VARIABLES	(1) LnFDI	(2) LnFDI
Sanctions_CountryLev	-0.134***	-0.132***
	(0.0492)	(0.0490)
Sanction	0.857***	/
	(0.303)	
CountryLev	-0.0298	-0.000440
	(0.131)	(0.135)
Retaliation	-0.381	0.0428
	(0.241)	(0.388)
LnGDP	1.045	0.931
	(0.877)	(0.935)
LnGDPRussia	-0.0546	-0.585
	(0.533)	(0.699)
WTO	0.150	0.367
	(0.246)	(0.341)
Constant	74.31	-0.683
	(181.4)	(18.85)
Observations	502	502
R-squared	0.795	0.797
Fixed Effects	i,j	i,j
Time Variable	Time Trend	Time FE

Model 3 – Sanctions-Soviet Interaction

This model analyzes the effect of sanctions on FDI for those countries that have been historically more integrated with Russia both from a political and an economic point of view. The results do not highlight any negative nor positive effect on the FDIs.

Table 15 – Model 4 FDI

The table reports the results from regressing then natural logarithm of the value of quarterly Foreign Direct Investments on a sanction dummy interacted with the soviet dummy for the 28 European Union member states, Australia, Canada and the USA for the 2010-2016 period. Sanctions dummy equals one when the sanctions imposed on Russia start; Soviet dummy equals one when a country has been historically influenced either politically or economically by Russia. All regressions further include the following control variables: Retaliation is a dummy equal to one after the counter sanction were imposed by Russia on the western economies; GDP is the quarterly gross domestic product form each sanctioning country; GDP Russia is the quarterly gross domestic product of Russia; WTO is a dummy variable equal to one when Russia is part of the World Trade Organization from the last quarter of 2012. All regressions further include country fixed effects. Column 1 uses a time trend; while, column 2 year fixed effects. Robust standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)
VARIABLES	LnFDI	LnFDI
Sanctions_Soviet	0.232	0.250
	(0.215)	(0.215)
Sanction	-0.00883	/
	(0.231)	
Retaliation	-0.421*	-0.192
	(0.224)	(0.389)
LnGDP	0.960	0.907
	(0.725)	(0.762)
LnGDPRussia	-0.0242	-0.607
	(0.511)	(0.662)
WTO	0.0733	0.367
	(0.228)	(0.306)
Constant	18.32	0.356
	(169.9)	(16.08)
Observations	611	611
R-squared	0.824	0.825
Fixed Effects	i,j	i,j
Time Variable	Time Trend	Time FE

4.4 Robustness

All the models analyzed above are robust to different controls which are not shown for brevity. First, I estimate the models from the Industry Level Analysis for Europe using time fixed effects instead of a time trend to investigate whether the results change. As explained in Section 3, year fixed effects would include the impact of sanctions for the years after the sanctions have been imposed (i.e. 2015 and 2016). Therefore, the sanctions dummy would only capture the effect of sanctions when they were imposed in the first quarter of 2014. The results do not change significantly neither in terms of magnitudes or in significance levels. The reason might be that the effect of the sanctions impacted the industries only on the year when they were imposed in 2014. In fact, after the imposition of the sanctions the firms were able to react and adjust to the sanctions framework.

Secondly, I investigate serial correlation. Serial correlation occurs when error terms from different time periods or cross-sections are correlated. Serial correlation alters the efficiency of the OLS standard errors but does not affect their unbiasedness or consistency. In fact, a positive serial correlation underestimates the standard errors making the parameters appear more precise than they are. Negative serial correlation, instead, standard errors are overestimated and thus opposite occurs: the parameters will appear less precise then they are. In order to control for serial correlation, I perform the analysis clustering standard errors at the country level. The results show that, in general, the results are robust to serial correlation.

As explained in the methodology section, a possible issue of the estimation is endogeneity, even though the Crimea crisis and the sanctions were all sudden events that surprised and shocked the world. Nonetheless, I perform the same analyses moving the sanctions dummy. More specifically, I perform the same regression models when the dummy is 1 and 2 quarters before and after the base estimation models. Therefore, the sanction dummy starts in these different four quarters: 1st of 2014 (-1 lag); 4th of 2013 (-2 lag); 3rd of 2014 (+1 lag); 4th of 2014 (+2 lag). I perform the regression model using a time trend and the PPI as a control for the industry analysis, using the time trend only for the macro analysis. The results are not shown for brevity.

In general, for the industry analysis, the results show that the 2-leads and 1-lead sanctions dummies (i.e. starting from the 4th quarter of 2013 and from the 1st quarter of 2014, respectively) make the coefficient of the sanctions more significant and negative in models from 1 to 4 for the European industries. This probably indicates how the industries were already facing difficulties in operating in Russia due to tensions and worsening of international relationship between Russia and the EU. However, the main interaction effects do not change significantly. With regards to the 1-lag and 2-lags dummies (i.e. the 3rd and 4th of 2014, respectively), the results do no change in significance but some performance measures display higher magnitudes. Most interestingly, for some performance measures we observe an effect of the sanctions dummy and higher magnitudes. This indicates that the sanctions might have affected industry performance after some time, like in the case of foreign turnover. This phenomenon might be due also to the sanctions framework that have become more and more limiting through time.

For the macro analysis, instead, the leaded models show lower magnitudes and less significance in general both for exports and FDI. The lagged models, instead, display higher magnitudes for the FDI model. In fact, companies and investors might take more time before withdrawing their investments.

5. Limitations

The results in the study show that there is somewhat an effect of sanctions on industries and exports of the sanctioning countries. However, the study present some limitations as it is always difficult to identify the effects for two main reasons. On the one hand, it is difficult to disentangle the sanctions effect from the fact that Russia economy has been struggling since the beginning of 2013, as Shirov et al. (2015) claim as well. On the other hand, since the sanctions have not ended, it is difficult to understand the cause of a decrease in economic relations between western economies and Russia. In fact, it could be due to the sanctions, a downturn in the Russian economy, a cyclical phenomenon or a combination of the three. Another important limitation of my study is data availability. In fact, more disaggregated data like firm level one would allow to better identify the effect of sanctions.

6. Conclusions

Throughout history, we have seen the raise of a foreign political instrument: economic sanctions. Amongst the many, surely everyone remembers the embargo on Cuba, the sanctions on Iran and most recently the sanctions on Russia. The reasons can be very different from promoting human rights to impeding nuclear proliferation; in general, all are underpinned by a moral motive. The last sanctions imposed in chronological order were those against Russia in response to its invasion and annexation of Crimea. Many have studied the efficiency of sanctions finding opposing results. In this paper, I investigate the effect of sanctions for the sanctioning economies. I analyze the effect of the sanctions against Russia on the industries of Australia, Canada, the 28 European Union member countries and the USA. My analysis shows that sanctions do have a negative impact on the European economies but not on the other economies. In fact, exposed European industries in economies where the level of debt is high across all industries experience a negative impact on their performances (i.e. turnover, production…). However, certain industries in some countries also benefitted from the sanctions. For example, those European countries that have been historically more integrated with Russia have seen their industries performance improve, probably due to a substitution effect. With regards to exports and FDI, the results show a negative effect for the former but not for the latter.

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APPENDIX A

Table 1 - Europe

NACE CODE	ID	Industry Name
MIG_CAG	1	Capital Goods
B05	2	Mining of coal and lignite
B06	3	Extraction of crude petroleum and natural gas
B07	4	Mining of metal ores
B08	5	Other mining and quarrying
B09	6	Mining support service activities
C10	7	Manufacture of food products
C11	8	Manufacture of beverages
C12	9	Manufacture of tobacco products
C13	10	Manufacture of textiles
C14	11	Manufacture of wearing apparel
C15	12	Manufacture of leather and related products
C16	13	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
C17	14	Manufacture of paper and paper products
C18	15	Printing and reproduction of recorded media
C19	16	Manufacture of coke and refined petroleum products
C20	17	Manufacture of chemicals and chemical products
C21	18	Manufacture of basic pharmaceutical products and pharmaceutical preparations
C22	19	Manufacture of rubber and plastic products
C23	20	Manufacture of other non-metallic mineral products
C24	21	Manufacture of basic metals
C25	22	Manufacture of fabricated metal products, except machinery and equipment
C26	23	Manufacture of computer, electronic and optical products
C27	24	Manufacture of electrical equipment
C28	25	Manufacture of machinery and equipment n.e.c.
C29	26	Manufacture of motor vehicles, trailers and semi-trailers
C30	27	Manufacture of other transport equipment
C31	28	Manufacture of furniture
C32	29	Other manufacturing

Table 2 - Australia-Canada-USA

ID	Industry Name
1	All Mining
2	Food
3	Beverage and Tobacco Products
4	Textile Mills and Textile Product Mills
5	Apparel and Leather Products
6	Wood Products
7	Paper
8	Printing and Related Support Activities
9	Petroleum and Coal Products
10	Basic Chemicals, Resins, and Synthetics
11	Pharmaceuticals and Medicines
12	Plastics and Rubber Products
13	Nonmetallic Mineral Products
14	Primary Metals
15	Fabricated Metal Products
16	Computer and Electronic Products
17	Electrical Equipment, Appliances, and Components
18	Machinery
19	Motor Vehicles and Parts
20	Furniture and Related Products
21	Miscellaneous Manufacturing

Table 3 – Variables list and description

Variable	Description	Database
Dependent Variables		
PPI	Production Price Index: the gross monthly change in the trading price of industrial products from the point of view of the producers/manufacturers	Statistical databases from governments of Australia, Canada, the EU and the USA
Output	Value of production per period	
Turnover	Total market sales to third parties and includes all other charges (e.g. transport and packaging) that are charged on the customer	
Domestic Turnover	Market sales which first destination based on the residency of the third party purchasing the good is the same of the production	Eurostat
Foreign Turnover	Market sales which first destination based on the residency of the third party purchasing the good is different form the one of production	Eurostat
Productivity	Production divided by working hours	Eurostat
FDI	Bilateral Foreign Direct Investments from country i to Russia	Central Bank of Russia Database
Imports	Russia total imports or imports by country and industry	Central Bank of Russia Database
Independent Variables		
Sanctions	Dummy variable equal to 1 when sanctions from Australia, Canada, the EU and the USA are in place	NA
Retaliation	Dummy variable equal to 1 when counter-sanctions from Russia are in place	NA
GDP	Gross Domestic Product of a sanctioning country	Statistical databases from governments of Australia, Canada, the EU and the USA
GDP Russia	Gross Domestic Product of Russia	
Oil Price	Price of Oil per barrel	World Bank
EER Russia	Effective Exchange Rate of the Russian ruble against a basket of currencies which represent the main trading partner of Russia	World Bank
Soviet	Dummy variable equal to 1 when a country was part of the USSR or particularly influenced by Russia	NA
WTO	Dummy variable equal to 1 when Russia is part of the World Trade Organization	NA
LevCountry	Debt to surplus ratio for all non-financial corporations by country and year	OECD Database
LevIndustry	Debt to total capital ratio by industry	Damodaran Database
DummyLev	Dummy variable equal to 1 when the LevIndustry is above median and zero otherwise	NA
Tariff	Trade tariff on Russian imports by country and industry	WTO Database

APPENDIX B

Table 1 – European Union Data Set Summary Statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
CODE Country	22,736	/	/	1	28
Industry ID	22,736	/	/	1	29
PPI	15,633	105.4	9.688	45.80	240.2
PPI_Domestic	15,432	105.0	9.036	45.80	207.8
PPI_Foreign	14,740	105.5	10.85	52.80	311.1
Production	14,893	105.3	28.97	0	677.7
Turnover	14,814	110.3	30.10	0	589.9
Domestic_Turnover	13,232	106.5	36.14	0	740.5
Foreign_Turnover	13,018	122.8	103.6	0	10,047
WkHours	16,156	103.1	60.20	0	2,500
Productivity	14,338	1.054	0.217	0	4.629
OilPrice	22,736	78.80	22.47	33.35	105.8
Sanctions	22,736	/	/	0	1
Retaliation	22,736	/	/	0	1
LevCountry	17,748	5.391	3.225	2.049	21.74
LevIndustry	22,736	29.37	10.77	15.22	57.74
GDP	22,736	104.0	10.38	75.20	151.5
GDP_Mill	22,736	155,635	235,926	2,065	986,304
Soviet	22,736	/	/	0	1
WTO	22,736	/	/	0	1
Exposed	22,736	/	/	0	1

Table 2 – United States of America Summary Statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
IndustryID	588	/	/	1	21
PPI	588	175.6	79.72	88.27	459.7
Turnover	588	73,643	68,701	8,196	379,194
OilPrice	588	78.80	22.49	33.35	105.8
Sanctions	588	/	/	0	1
Retaliation	588	/	/	0	1
LevCountry	588	6.853	0.323	6.589	7.576
LevIndustry	588	28.23	10.49	12.72	60.07
GDP	588	1,676,000	1,239,000	14,681,100	18,869,400
WTO	588	0.607	0.489	0	1
Exposed	588	0/	/	0	1

Table 3 – Canada Summary Statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
IndustryID	588	/	/	1	21
PPI	532	105.6	7.222	87.10	141.3
Turnover	560	5,812	5,411	280.7	22,283
OilPrice	588	78.80	22.49	33.35	105.8
Sanctions	588	/	/	0	1
Retaliation	588	/	/	0	1
LevCountry	588	6.853	0.323	6.589	7.576
LevIndustry	588	28.23	10.49	12.72	60.07
GDP	588	426,804	36,411	345,882	480,949
WTO	588	/	/	0	1
Exposed	588	/	/	0	1

Table 4 – Australia Summary Statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
IndustryID	588	/	/	1	21
PPI	588	101.1	7.015	60.20	125.7
Turnover	448	8,748	11,769	1,178	61,211
OilPrice	588	78.80	22.49	33.35	105.8
Sanctions	588	/	/	0	1
Retaliation	588	/	/	0	1
LevCountry	588	1.990	0.282	1.674	2.522
LevIndustry	588	26.16	8.066	15.23	48.37
GDP	588	389,096	24,583	339,948	438,539
WTO	588	0.607	0.489	0	1
Exposed	588	0	0	0	0

Table 5 – Aggregate Dataset for Australia, Canada and the US summary statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
IndustryID	1,764	/	/	1	21
Country	1,764	/	/	1	3
PPI	1,708	128.2	58.37	60.20	459.7
Turnover	1,596	31,626	53,084	280.7	379,194
OilPrice	1,764	78.80	22.48	33.35	105.8
Sanctions	1,764	/	/	0	1
Retaliation	1,764	/	/	0	1
LevCountry	1,764	5.232	2.314	1.674	7.576
LevIndustry	1,764	27.54	9.790	12.72	60.07
GDP	1,764	5,859,000	7,744,000	339,948	18,870,000
WTO	1,764	/	/	0	1
Exposed	1,764	/	/	0	1

Table 6 – Data Set for Aggregate Exports by Country and Industry Summary Statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
CountryID	58,900	/	/	1	31
ProductID	58,900	/	/	1	99
ExportUSTh	58,900	10,274	65,115	0	2,713,000
Sanctions	58,900	/	/	0	1
Retaliation	58,900	/	/	0	1
LevIndustry	58,900	25.94	9.136	12.72	60.07
LevCountry	47,500	5.384	3.258	1.674	21.74
GDP_th	58,900	167,000,000	234,600,000	2,212,000	986,300,000
GDPRussia_th	58,900	338,900,000	42,970,000	261,800,000	422,300,000
Continent	58,900	/	/	1	3
EERRussia	58,900	92.41	13.96	67.77	109.5
TariffSimpleAvg	49,036	9.694	5.049	0	52.50
TariffWeightedAvg	49,036	9.401	5.608	0	52.50
WTO	58,900	/	/	0	1
Exposed	58,900	/	/	0	1

Table 7 – Data Set for Total FDI by Country

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
ID	868	/	/	1	31
FDI	837	209,536	1,065,000e+06	-5,326,000	15,120,000
GDP	868	707,600,000	2,950,000,000	2,065,000e+06	18,870,000,000
GDPRussia	868	306,200,000	65,540,000	175,300,000	422,300,000
Sanction	868	/	/	0	1
Retaliation	868	/	/	0	1
LevCountry	696	5.372	3.132	1.674	21.74
Soviet	868	/	/	0	1
WTO	868	/	/	0	1