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What goes around comes around: The effects of sanctions on Swedish firms in the wake of the Ukraine crisis [†]

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Abstract

This paper focuses on the effects of sanctions on Swedish firms' sales across markets, as well as sanctions' effects on their domestic production. As a case study, the paper uses sanctions imposed on Russia and by Russia in 2014. The results suggest that the total costs of these sanctions due to a drop in sales for Swedish firms amounts to around 1 billion SEK in 2013 prices, which implies a rather limited impact on the Swedish economy overall, which amounted to a total of around 4000 billion SEK in 2013.

The total impact may be divided into a target effect and a sender effect. The target effect is reflected in a 65% drop in sales of banned products in the Russian market, while the sender effect on exports outside Russia was less important.

The ripple effects on other markets of these sanctions were, however, asymmetrical and complex. Sales on the domestic market was on average intact while exports to markets facing the same type of sanctions fell. The most vulnerable firms could face a loss in sales of more than 40% of their value added, and the most important firm-level mechanism, as to how firms responded in their domestic production, was financial distress. I found, however, an additional mechanism within firms regarding their export response on markets other than Russia, since the negative impact was concentrated on their fringe products, while their core business remained intact after the sanctions were implemented.

JEL classification: F13, F14, F51, R11
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1 Introduction

Economic sanctions have a long history in international policy as a tool for curbing aggression or misbehaviour of states and their ruling elites.[1] The underlying idea is that sanctions should inflict an economic cost on the targeted economy through rolling back gains from trade, or from other forms of international transactions, such as investments and capital flows. Hence, the ruling elite is incentivised to change their policies to avoid these costs. The success of economic sanctions in coercing targeted regimes has, however, been questioned (see e.g. Hufbauer et al. 2009), and an often cited early failed embargo is the one Athens employed on Megara in Ancient Greece to force them into becoming an ally.[2] Instead, the sanction acted as a spark for the Peloponnesian War (see Drezner 1998).

Bergeijk (2009) stressed that one should assess the fine-grain effectiveness of sanctions instead of using a binary assessment on whether they were successful or not, especially since economic sanctions 'cannot be expected to succeed if, for example, economic linkages are too weak, so that no or hardly any damage can ever be done' (Bergeijk 2009, p. 119). That is, the probability that a trade embargo or an economic sanction actually coerces misbehaviour depends on the costs it inflicts on the targeted economy. The importance of trade links when it comes to predicting the costs of economic sanctions is also emphasised by Kaempfer and Lowenberg (2007), who used the traditional trade model and terms of trade to anticipate the welfare costs. That is, sanctions roll back the targeted country to a non-trade equilibrium, so that welfare gains from trade disappear or are mitigated. The magnitude of the cost of sanctions therefore depends on the relationship between the sender and the target before they are implemented. A larger sender economy (or group of senders) implies that the target economy is more dependent on the sender market and, hence, trade sanctions will roll back the target economy closer to its autarky equilibrium. This analysis also highlights the costs inflicted on the sender, since trade goes in both directions. The larger the targeting country, the costlier it is for the sender, since their gains from trade are also rolled back. This aspect of sanction costs has, however, attracted little attention. Two exceptions are Crozet and Hinz (2016) and Besedeš et al. (2018), and the former found support for a sender effect when they studied the sanctions against Russia after

[1] Although positive sanctions, such as aid or different types of co-operations, are also used to influence the behaviour of states, I will focus completely on negative sanctions in this study.

[2] The comprehensiveness of this embargo was, however, questioned by Stantchev (2012)

2014, while the latter found very limited effects when they studied the impact on German firms due to financial sanctions.

The effects of trade barriers on welfare, due to the size of trade flows, is also manifested in the workhorse model of international trade of today (see Anderson and Wincoop 2003). Feenstra (2016) showed how gains from trade in newer trade models could be estimated with the help of changes in trade shares.[3] A higher share of imports in domestic expenditures implies greater gains, which also implies potentially greater losses from sanctions. Bergeijk (2009) assessed the importance of trade links when it comes to the efficiency of trade sanctions, using the database collected by Hufbauer et al. (2009), and he found that the probability of a sanction being successful increased with stronger trade links between the sender and the target.

The effectiveness of sanctions is not only about inflicting the highest possible cost on the target economy, since the dynamics of sanctions also depend on, for example, future expectations and internal dynamics. Drezner (1998) and Drezner (1999) argued that a target expecting further conflicts in the future may take these into consideration and thus be less likely to make concessions. In addition, the targeted economy should not be viewed as an aggregate, but instead as a complex composite of different groups (exporters versus importers, rural versus urban, political leaders/elite versus others, etc.). The distribution of sanction costs across groups may be more important than the size of the total costs when it comes to concessions (see e.g. Kirshner 1997 and Kaempfer and Lowenberg 1988).[4] The very high humanitarian costs that resulted from the unsuccessful sanctions targeted against Iraq, the former Yugoslavia and Haiti in the 1990s also raise the question of the distribution of costs, since these sanctions seemed to strengthen rather than curb the targeted regimes.[5] To minimise humanitarian costs and, at the same time, increase the precision of sanctions, sending countries have started to use 'smarter' and more precise sanctions (see Drezner 2011; Kaempfer and Lowenberg 2007; Kirshner 1997) with the objective of targeting a certain group.

The preceding discussion highlights several important aspects when it comes to sanction effects. First, the total impact on the economy; second, that sanctions may influence both the

[3]The exact relationship between gains from trade and the trade share depends on the specification of the model, as discussed in Feenstra (2016), Melitz and Redding (2015) and Arkolakis et al. (2012).

[4]The empirical finding of Bergeijk (2009) that democracies are more likely to concede to sanctions (see also the survey of Kaempfer and Lowenberg 2007) also indicates that the internal dynamics of sanctions may differ across countries with different regime types.

[5]The humanitarian costs of sanctions, according to Allen and Lektzian (2013), could be as severe as a military conflict.

target and the sender economy; third, the internal dynamics or the allocation of sanction costs within an economy. The aim of this paper is to contribute to the literature by focusing on Swedish firms, and how they were influenced by the sanctions implemented after the Ukraine crisis against Russia (sender effect), and the counter-sanctions by Russia (target effect). The sanctions in the wake of the Ukraine crisis form a particular interesting case-study, since they were both unpredictable and very specific. The sanctions resulted from a set of actions that developed within a short period of time, while Russia's counter-sanctions were directed towards a small set of products.[6] Hence, firms had little time to adjust, and little knowledge about the specific sanctions before they were implemented.

The origin of the sanctions against and from Russia was the internal conflict within Ukraine during the autumn of 2013, leading to the Ukraine revolution (or the Euromaidan revolution) in February 2014. This, in turn, led to 'the illegal annexation of Crimea and deliberate destabilisation of a neighbouring sovereign country' (European Union 2015). As a response, the EU, among others, introduced a set of smart sanctions, including diplomatic measures, travel bans, asset freezes and economic sanctions.[7] Russia, in turn, answered quickly with counter-sanctions. On 7 August 2014, the Russian Government introduced an import ban of certain food products. The list of banned products was modified in a decision of 20 August 2014 (see Russian Government 2014), and it has thereafter been prolonged several times. The ban of listed products, at the time of writing, will last at least until 31 December 2018.

This paper relates to several strands of the literature, and one is the literature on the total welfare effects of sanctions. A general lesson from this literature is that the costs of sanctions in target countries, as forgone income or production, could be substantial.[8] Irwin (2005) and O'Rourke (2007) both focused on the US in the early 19$^{\text{th}}$ century, and they found a negative effect of around 5% annually on US income due to the self-imposed embargo on international shipping (i.e. the Jeffersonian Trade Embargo) and the 'widespread economic warfare' during the Napoleonic war (1807-1814). A similar magnitude of negative effect was found on GDP

[6] All banned products belong to section I, II and IV of the CN nomenclature, but only a sub-set of the products were affected. Within the product group 02 (meat and edible meat offal), for example, products of meat of bovine, pork and edible offal of poultry were banned, while other products were not. In addition, the share of banned products in total export value formed only around 30-40% of the total export value within the 2-digit groups that were affected.

[7] In addition to the EU, the US and ten other countries also introduced sanctions targeting Russia due to the Ukraine crisis. See Crozet and Hinz 2016 for a detailed and extensive overview of events during this crisis

[8] See e.g. the surveys in Bergeijk (2009) and Hufbauer et al. (2009).

growth in Neuenkirch and Neumeier (2015) when they investigated the impact of more recent sanctions for a large number of countries over the period 1976-2012. Dizaji and Bergeijk (2013) also found a considerable, but short lived (around two years), impact on the Iranian economy due to the oil boycott. In contrast to these broad sanctions, smarter sanctions are expected to be less severe, and the ones targeting Russia in 2014 seem to have had little impact (see e.g. Dreger et al. 2016).

Another related strand is the literature on the trade effects of sanctions, which has been shown to be important in, among others, the cases of South Africa (Evenett 2002), Germany when it comes to capital flows (Besedeš et al. 2017, 2018), Iran (Haidar 2017) and Russia (Crozet and Hinz 2016; Oja 2015).[9] Oja (2015) focused on Russia's counter-sanctions using product-level data from the Baltic states; his results support the rather lukewarm overall impact of sanctions originating from the Ukraine crisis. The total trade effect amounted to not more than around 0.5% of GDP, which seems to be a rather small impact for countries with a relatively high Russian trade dependence. This was explained by a high degree of re-exports, and by the fact that the targeted products formed a small share of total exports in the targeted countries.

Two highly relevant studies focusing on the trade effects of sanctions are Crozet and Hinz (2016) and Haidar (2017), which both used disaggregated information to assess several aspects of sanctions. Crozet and Hinz (2016) assessed the Russian sanctions using two different datasets, one based on country-product-destination-month (from UN Comtrade) and another based on firm-product-destination-month information (restricted to French firms with Russian export experience and 4-digit level aggregated trade flows). The country-level analysis suggested that the lion's share of the trade destruction in Western countries due to the embargoes was found within the EU, but also that the destruction was mostly in products not targeted by Russia's counter-sanctions. A pattern they considered as a 'friendly fire' (see Crozet and Hinz 2016, p.47), which they argued could be a result of a sender effect, since the sanctions on Russia may hamper financial transactions of firms exporting to Russia. Focusing on France and micro-data, they thereafter investigated how firms reacted to these sanctions. Interestingly, the sender effect was also visible in this dataset, but they found no evidence of a trade deflecting pattern of embargoed products. That is, when the Russian market closed down, firms didn't expand into markets other than Russia in order to compensate for the loss of trade. In contrast, Haidar

[9] see also the survey in Bergeijk 2009

(2017) found evidence of such a trade-diversion pattern when he focused on the sanctions targeting Iran's non-oil exports due to its uranium enrichment program.[10] Haidar (2017) used information on firm-product-destination-day level to investigate the impact of these sanctions, and he found a significant trade destruction. A large part of the lost trade (around two-thirds) was, however, deflected into non-sanctioning countries. The results support the prediction of a rather weak sanction effect when the sender economies only constitute a part of all possible export destinations (see Kaempfer and Lowenberg 2007). An interesting extension to this paper is that Haidar (2017) investigated whether firms respond differently, and he found that trade deflection was greater for larger firms with historical ties to non-sanctioning destinations, and for homogeneous goods.

Finally, this study is also related to the literature on interdependence across markets within firms. Although a large part of the literature on firm export behaviour side-steps the possibility of a transmission of an idiosyncratic shock across markets within a firm (e.g. Melitz 2003, Bernard et al. 2003 or Bernard et al. 2010), there is a small but increasing literature investigating, both theoretically and empirically, whether these transmissions are of importance.[11] One point of departure in this literature is that firms face a convex cost function due to production constraints. So, when total production increases due to a demand shock in one market, sales in other markets fall, since the opportunity costs change with a higher marginal cost (see Soderbery 2014; Vannoorenberghe 2012). The substitution effect across markets within firms is, however, not the only prevailing expectation. Berman et al. (2015) suggested a complementary effect instead, which was backed up with empirical evidence.[12] One plausible explanation to this complementarity was firms' financial restrictions. That is, extra profit from one market, spurred by a positive demand chock, may lead to lower costs of production, since it frees up a firm's financial restrictions, facilitates its access to external finances and/or improves its reputation.

The present paper contributes to all these strands of literature in several dimensions, by using detailed information of all plants' and firms' location, domestic production and trade with foreign markets. The present study will be the first time, to my knowledge, there has been an analysis of the complete set of possible responses on the product level when it comes to firms'

[10] These sanctions were set up by the US, the EU, Canada and Australia in March 2008

[11] See Ball et al. (1966), Berman et al. (2015), Bugamelli et al. (2015a), Faini (1994), Soderbery (2014), and Vannoorenberghe (2012).

[12] The complementary relationship also has support in Bugamelli et al. (2015b), which found, using Italian data from 2012, that 'the drop in domestic sales has reduced the growth of exports by 0.6 percentage points'.

allocation of sales across markets (foreign as well as domestic) and production, after they have been hit by a product and/or a market-specific shock due to being a target and/or a sender of sanctions. In addition, the present paper contributes to the knowledge of how firms respond to shocks to foreign markets in general, and to the internal dynamics of sanctions in particular, by investigating important mechanisms behind a heterogeneous response pattern.

The results suggest that the total impact of the sanctions on the Swedish economy is negligible, but that the costs are asymmetrically distributed across regions, industries and firms. Although the target effect at firm level amounts to more than a 60% drop in firms' sales volume, the smaller but wider sender effect forms more than 90% of the total loss of Swedish firms. In addition, the sanctions mostly hurt vulnerable firms (especially those in financial distress) and firms respond by dropping exports of fringe products. The domestic market and the core business is, however, intact.

This paper is structured as follows: the next section briefly discusses the possible impact of sanctions, the data used and the empirical specification. The results are presented in the section thereafter, while the final section concludes.

2 The impact of sanctions

The theoretical literature on sanctions focuses mostly on aggregate trade patterns and less on firm-level costs or export responses.[13] There is, however, a small but growing literature on how a market-specific shock, such as a sanction, influences firms' allocation of sales across destinations. An early paper on this topic argued for a substitutability between destinations due to resource constraints. Ball et al. (1966) showed that an increased domestic demand will compete for firms' constrained resources and, hence, undermine their export performance. Faini (1994) derived the same relationship with the help of a putty-clay technology since input fixity after an investment has taken place implies that firms face a convex cost function. Markets are therefore linked within a firm, because an increased demand on one market drives up capacity utilisation and variable costs, which implies that sales in other markets fall. These ideas have been further developed in a heterogeneous-firms model by Soderbery (2014) and Vannoorenberghe (2012). While the aforementioned studies give some empirical evidence for a substitutability across

[13] One exception is Crozet and Hinz 2016, who used firm-level exports as a building block in a structural gravity equation.

markets within firms, Berman et al. (2015) came to the opposite conclusion. They found that a 10% increase in exports generated 1-3% more sales in the domestic market.[14] One possible explanation for a complementarity between markets, discussed in Berman et al. (2015), may be that extra revenues from one market facilitate liquidity-constrained firms' production when it comes to fulfilling 'their working capital requirements'.

Turning to the literature focusing on sanctions and firm performance, the centre of attention has been on trade destruction and deflection. In this setting, trade destruction is closely related to the measurement of sanction costs, since it measures how much trade is rolled back between the sender and the target. Trade deflection (or trade diversion) indicates whether the target could avoid these costs by expanding in other markets instead.[15] Hence trade deflection reflects the efficiency of sanctions, since the cost of sanctions on the target economy falls when it could find other markets. Besedeš et al. (2017), Crozet and Hinz (2016), Evenett (2002), and Haidar (2017) all investigated the importance of both trade destruction and deflection using firm-level data, but in very different settings and they found different results. Evenett (2002) and Haidar (2017) found evidence of a strong trade deflection, which mitigated the impact of sanctions directed towards South Africa and Iran, respectively. One reason for the high degree of deflection is that these sanctions were not universally implemented, so firms in these countries found new markets for their goods. Besedeš et al. (2017) support these findings, since they found very different deflection behaviour in regards to German cross-border capital flows, depending on whether the sanctions were implemented by the EU (i.e. a relatively small part of the world's financial market) and the more general sanctions issued by the UN. That is, sanctions reduced financial flows (both in volumes and number of transactions), but if these were imposed by only a subset of countries, then the target could evade some of the sanction costs. These studies suggest a substitutability across markets. A negative shock in one export market, in the form of a sanction, forces firms to redirect their sales as market opportunities change. The results in Crozet and Hinz (2016) suggest an alternative sanction dynamic, since they found complementary effects when they focused on French firms and the Russian counter-sanctions. 'Firms that exported agricultural and food products targeted by the Russian embargo saw their total exports decrease

[14] They used French firm-level data and exogenous shocks, and they also showed the importance of using exogenous shocks since estimates based on OLS revealed a substitutability between markets instead of a complementarity.

[15] Note, however, that the domestic market is excluded in all these studies.

by 31.78%..., i.e. more than their pre-events share of exports to Russia' (see Crozet and Hinz 2016, p. 48).

2.1 Data and empirical specification

The data originates from three registers of Statistics Sweden. One (UHV) covers detailed information about firms' exports and imports on the product level (8-digit CN codes) and destination level, for both values and quantities between 2010 and 2016. The second one (IVP) includes equally detailed information on firms' production during the 2010-2015 period, but it is restricted to firms with at least 20 employees. The final dataset (FEK) covers all firms in Sweden and includes a number of variables at firm-level (e.g. number of employees, sales, investments etc.) and plant-level (e.g. location and number of employees) up to 2014, which will be used to characterise firms before the sanctions were implemented.

I start out with a restricted sample, focusing on a narrow set of similar products to mitigate potential biases due to product specific unobserved trends, such as changes in technology, demand or policies. The initial focus is on firms that export and/or produce products belonging to the same 2-digit CN chapters as the products banned by the Russian government belong to (see Russian Government 2015).[16] Although this restriction may improve the identification of the counter-sanction effects (i.e. the target effect), it may lead to a biased estimation of the sender effect. Especially since firms exporting products other than those within the 2-digit groups with banned products to Russia are excluded, although they may be influenced by the sanctions levied on Russia. Therefore, I compare the results from the restricted sample with the results from using all products.

To identify both the direct and the indirect effects of being a target and a sender, I divide the sample into five different categories (four when I focus on production). Table 1 presents the allocation of these categories for the restricted sample before the sanctions were implemented, and is based on three different indicator variables (P, R and RC).

The two first categories capture the target effects and are therefore product specific. One focuses on the direct effect of Russia's counter-sanctions, which is captured by the interaction PR that takes the value 1 if a firm exported banned products to Russia. This group is rather small in the export data, due to the vast number of destinations and products, while it forms

[16] The CN chapters included are 03, 04, 07, 08, 16, 19 and 21.

around 3% of all observations in the production data (and 10% of all firms). The second category, i.e. the indirect target effect, may be viewed as a ripple effect, since Russia not only closed its borders for Swedish firms, but also for foreign firms located in other Swedish destinations. Thus, the competition when it comes to banned products may have increased in markets other than Russia. This is captured by P, which takes the value 1 if a firm exported banned products (independent of the destination). The share of all export observations before 2014 consisting of banned products to destinations other than Russia was around 46% (and 69% of all firms). The same figure in the production data was 26% (and 50% of all firms).

An additional set of sanction effects is the destination-specific sender effects resulting from the fact that sanctions implemented against Russia may obstruct Swedish firms' business in Russia (see Crozet and Hinz 2016). The third category in Table 1 is the direct sender effect, which captures the impact of exporting to Russia, although these firms did not export banned products and this category forms around 1% of all observations in the export data (and 3% of all firms). This category is captured by R, which takes the value 1 when a firm exported to Russia (independent of the product). The fourth category captures the potential ripple effects of the sanctions levied on Russia due to the impact from problems of doing business in Russia on firms' exports to other markets. This effect is captured by RC, which takes the value 1 when a firm that exported to Russia also exported to other markets. The potential ripple effect across markets within firms was found in 22% of all observations in the export data, while it amounts to 18% of all observations in the production data.[17]

The final category consists of the control group, which is formed by both a variation within as well as between firms across different products. This group forms approximately one-third of all observations in the restricted export data, while the same figure in the production data is around 45%. Note that the sender effect due to sanctions against Russia is firm-specific, since it creates ripple effects across markets within firms exporting to Russia, independent of whether they export products banned by Russia or not. This effect is captured between firms with and without Russian export connections, and in this case the control group consists of 26% and 45% of all firms in the restricted export category and the production data, respectively.

A comparison in Table 1 between firms facing any kind of sanction effect and those forming

[17]Note that the direct and the indirect sender effect is not possible to disentangle in the production data. Hence, R the production data takes the value 1 if a firm exported products other than banned ones to Russia.

the control group shows no visible difference between demeaned values at firm-level (for sales, employment and exports), at firm-destination-product level (for export volumes and prices) and at firm-product level (for production volumes and prices). That is, the treatment group and the control group have similar characteristics before the sanctions were implemented.[18] Figure 1 presents some additional support for a sudden sanction effect by comparing exports to Russia and to the rest of the world (RoW), for both banned and non-banned products. It also lends additional support to explaining the sudden disruption of Swedish exports as being due to both being a target and a sender of sanctions, which is clearly visible after 2013. The target effect is evident by the dramatic drop in exports to Russia of products banned on the Russian market, compared to the stagnate export trend to the rest of the world. The sender effect may be discerned by the divergence in the export trends of non-banned products to Russia compared to the rest of the world.[19].

The empirical specification used to capture the sanction effects is the following one:

$$z_{ipdt} = PR_{pdt} + P_{pt} + R_{dt} + RC_{dt} + \alpha_{ipd} + \lambda_{st} + \epsilon_{ipdt}, \tag{1}$$

where z is firm i's sales margins of product p to destination d at year t, α_{ipd} is a firm-product-destination fixed effects while λ_{st} captures product-time fixed effects (using 3-digit CN product groups), and the sanction effects are captured as described above with PR (i.e. 1 if the product is banned and exported to Russia), P (i.e. 1 if the product is banned), R (i.e. 1 if the destination is Russia) and RC (i.e. 1 for all other markets but Russia if firm i export to Russia). The sales margins consists of quantities and price (i.e. q_{ipd} and p_{ipd}) as well as exit (i.e. 1 if the export flow ends the year after, 0 otherwise).[20] Since I have information on production quantities and prices, I construct the sales margin at product-level for the domestic market by adding imports from all sources to the production and thereafter subtracting exports to all destinations at product-level. Sales to the domestic market are restricted to firms with at least 20 employees, and to the period of 2010-2015 due to lack of production information for smaller firms and for later years. I will,

[18]The difference in mean between these two groups is based on demeaned values in order to reflect the difference-in-difference approach used to assess the sanction effects.

[19]Note that some products, (see Russian Government 2014), within the group of banned products were excluded from the ban (e.g. lactose-free milk and Salmo salar)

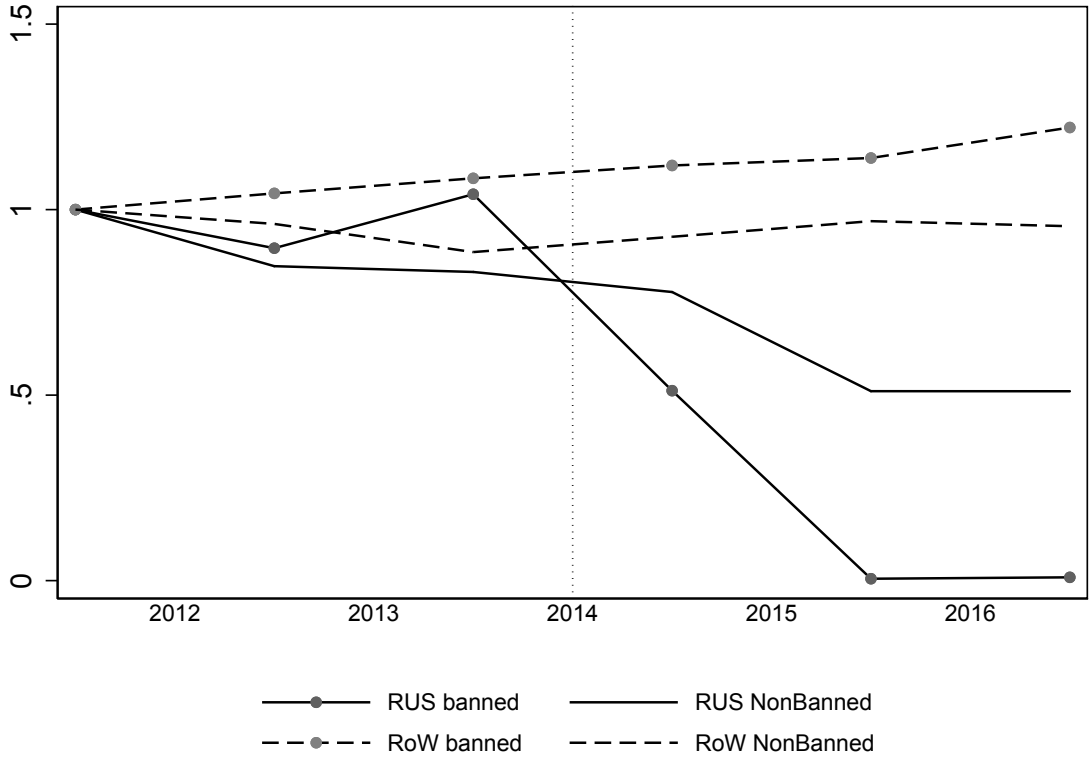
[20]Since the price of a product is measured as unit values, i.e. value divided by volume, the sanction effects on values are formed by the individual effects on quantities and prices. Hence, I drop the value margin.

Table 1: Treatment structure.

	% of observation in the 2010-2013 period.	
	Firm level	Firm-product(-destination)
Export data 2010-2016		
Total # of: observations 84,416, firms 2,618		
Export of banned products to Russia, *PR*:	3	0.4
Export of banned products (excl. *PR*), *P*:	69	46
Export to Russia (excl. *PR*), *R*:	3	0.8
Russian connection (all destinations but Russia), *RC*:		22
Control group:	26	31
T-stat from differences in means (control vs treatment)		
Firm sales (demeaned): 0.87		
Firm employment (demeaned): 0.45		
Firm exports (demeaned): -0.92		
Firm-Destination-Product exports (demeaned): -0.30		
Firm-Destination-Product export price (demeaned): 0.78		
Production data 2010-2015		
Total # of: observations 7,405, firms 355		
Production of banned products and export to Russia, *PR*:	3	10
Produce banned products (excl. *PR*), *P*:	50	26
Russian exports (excl. *PR*), *R*:	2	18
Control group:	45	46
T-stat from differences in means (control vs treatment)		
Firm sales (demeaned): 0.12		
Firm employment (demeaned): -0.98		
Firm-Product production (demeaned): 1.43		
Firm-Product product price (demeaned): 0.95		

Note: The data is formed by all observation before 2014 consisting of firms exporting and/or producing products belonging to the same 2-digit CN-codes as those products banned by the Russian government in 2014. The interaction term *PR* is excluded when the allocation to *P* and *R* is reported to avoid double counting. The test of mean differences between the treatment and the control group is demeaned at the appropriate level (firm, firm-product or firm-destination-product) to reflect the difference-in-difference approach in the empirical part.

Figure 1: Export to Russia (RUS) and the rest of the world (RoW) for banned and non-banned products.



Note: Export index using current prices and 2011 as base year.

however, contrast these results with those results collected from only using export flows for all firms during the 2010-2016 period.

In addition to the results focusing on the allocation of sales across markets, I will also assess the impact of sanctions on domestic production directly, with the following specification:

$$z_{ipt} = PR_{pt} + P_{pt} + R_{it} + \alpha_{ip} + \lambda_{st} + \epsilon_{ipt}, \tag{2}$$

where z is the production margins in quantities and prices of firm i's product p.

3 Results

3.1 Sanction effects across markets

The first set of results are found in Table 2 and 3, which are based on the restricted sample focusing on food products. The results clearly show that the sanction effects after the Ukraine crisis were real and substantial. The export quantity dropped by 65% on the Russian market for firms exporting banned products, while it dropped by around 10% on other markets if firms exported to Russia or if they exported banned products.[21] In other words, my results are in line with Crozet and Hinz (2016) in showing both the direct and indirect effect of sanctions are important. Although Crozet found larger reductions of exports of embargoed products from targeted countries – about 87% (around 85% for EU countries and 82% for France). The negative ripple effects (or the indirect effects) on markets other than Russia, due to the fact that a firm either exported banned products (indirect target effect) or exported to Russia (indirect sender effect), suggest that the market-specific chock consisting of the sanctions implemented after the Ukraine crisis had a similar complementarity between markets within firms, as discussed in Berman et al. (2015). That is, a negative shock in Russia weakens a firm's export position in other markets as well.

I investigate this ripple effect into other markets in more detail by first excluding the domestic market in order to have a sample that is more in line with earlier studies focusing on sanction effects, and the results are shown in Table 2 column 4. Although the overall picture is unchanged, the magnitude of the sanction effects increases, which indicates that firms may behave differently

[21] The former effect is measured as 100[exp(-0.096-0.469-0.483)-1].

in the domestic market. To further investigate this, I use the full sample and interact a domestic market indicator (in column 2), as well as a dummy for non-sanctioned countries (in column 3) with a binary variable capturing both ripple effects simultaneously (i.e. combining P and RC). The results suggest that the negative ripple effect of sanctions is concentrated on foreign markets facing the same set of sanctions as the Swedish firms. The ripple effects are not symmetric, however, as the results in column 1 of Table A.1 show. Firms exporting products banned on the Russian market keep their sales volume in the domestic market, while those exporting to the Russian market (but not necessarily banned products) have unchanged sales volumes in non-sanctioned countries. This suggests a complex transmission of a market-specific shock within firms, depending on the nature of the shock and/or the type of firms facing such a shock. Although the mechanisms behind the transmission of the sanction shock within firms will be studied in more detail in the following section, column 3 in Table A.1 shows that the ripple effects seem to be concentrated in firms not producing products that have been banned by the Russian government.

A comparison between the effects on quantities and prices (see Table 3), shows that firms absorb the market shock due to sanctions mostly by reducing quantities instead of prices. Although firms on the Russian market and firms selling banned products on other markets seem to increase their prices slightly, the direct impact of the counter-sanctions strengthens the negative impact on firms selling banned products on the Russian market.

When it comes to firms' exit decisions, or the extensive margin of trade, I investigate this with the help of a linear probability model using the last export year for each product and destination as the exit year.[22] The results are found in column 3-5 of Table 3, and the pattern is consistent with the pattern found for the intensive margin in all but one dimension. First, firms on the Russian market increased their general probability of exiting with 0.10, while the probability to exit increased with additional 0.36 units if firms also exported banned products. In other words, the Russian counter-sanctions more or less closed the Russian market for these firms.

Second, the probabilities of exiting other export markets for firms with Russian connections, or firms selling banned products on other markets, are, however, decreasing instead of increasing.

[22]Note that this restricts the sample period, since I have no information on whether the exports in 2016 are continuous or not.

This surprising result suggests that a market-specific shock reducing the probability of survival in one market increases the probability of survival in another market. This result is at odds with the negative ripple effects on the intensive margin. However, a comparison between the extensive and the intensive margin is not straightforward, since the extensive margin of trade is also influenced by sunk-costs of exporting on product-level, destination-level and firm-level. A plausible firm response when one market is closed may hence be to re-allocate firm-level fixed resources used for Russian exports to other export destinations. This implies that a firm may put more effort into other existing markets and increase its probability of staying in those markets. To investigate this possibility, I have interacted the combined ripple effects with a dummy taking the value of 1 if a firm exports to 5 or more markets. The result (see column 5) suggests that the counter-intuitive results of an increased survival due to ripple effects are only found among successful exporters who already reach many markets. Less successful exporters exit to a higher degree from all markets after they have been subject to the sanctions.[23] An interesting finding was that when I used a similar specification for quantities and prices, then the results were unchanged and the interaction term with many export destinations was insignificant.

When it comes to the production pattern in Sweden, the results are presented in Table 4 and in the first column I exclude firms that import the same good as they produce, in order to refine the sanction effects on production. This seems, however, to have a minor impact since the sample focusing on non-importing firms reveals that producers of banned products who exported to Russia reduced their output by around 25% while including importers suggests a slightly lower sanction effect of around 21%.[24] The ripple effects (i.e. either producing a banned product or being on the Russian market) are less important for the production pattern although I detect a small negative impact when I broaden the sample to all products (i.e. a 6% drop in quantity produced). The lack of ripple effects is, however, in line with the earlier results on sales across markets when we compared producers of banned products with non-producers. In addition, the effect is real in the sense that prices are more or less unchanged by these negative shocks, except for a rather small negative impact on prices due to ripple effects.

[23] I found the same results if I used the number of export destinations instead of a dummy for more than four export markets or if I used a greater number of dummies indicating different thresholds.

[24] Note that the exit decision is excluded since firms' production pattern is very persistent and very few products are dropped during the period of interest.

Table 2: Sanction effects on sales.

	(1) Quantity	(2) Quantity	(3) Quantity	(4) Quantity
Banned products	-0.096*	-0.113**	-0.115**	-0.141***
	(0.057)	(0.049)	(0.048)	(0.030)
Russian exports	-0.469***	-0.466***	-0.464***	-0.666***
	(0.037)	(0.039)	(0.039)	(0.026)
Russian exp. × Banned prod.	-0.483***	-0.467***	-0.640***	-0.597***
	(0.050)	(0.046)	(0.100)	(0.022)
Russian connections	-0.102*	-0.098*	-0.125**	-0.096**
	(0.052)	(0.052)	(0.059)	(0.048)
Ripeff × domestic		0.176***	0.184***	
		(0.041)	(0.039)	
Ripeff × non-sanctioned			0.180**	
			(0.073)	
Observations	42921	42921	42921	60895
Adjusted R^2	0.82	0.82	0.82	0.81
VCE	cluster	cluster	cluster	cluster
Cluster variable	Destination	Destination	Destination	Destination
Fixed effects	ProdgrYear	ProdgrYear	ProdgrYear	ProdgrYear
	FirmProduct-Dest	FirmProduct-Dest	FirmProduct-Dest	FirmProduct-Dest

Notes: Figures in parentheses are clustered standard errors and stars indicates the level of significance (* 10%, ** 5% and *** 1%). The time-specific fixed effects vary across product groups (i.e. 3-digit CN-codes). The mismatch of number of observations compared to the total number of observations discussed in the data section depends on singletons, which are dropped in the analysis. Ripeff combines the effect of selling banned products and having Russian connections.

Table 3: Sanction effects on sales, prices and exits.

	(1) Price	(2) Price	(3) Exit	(4) Exit	(5) Exit
Banned products	0.032*	0.032*	-0.027**	-0.039**	0.003
	(0.017)	(0.017)	(0.013)	(0.019)	(0.018)
Russian exports	0.112***	0.112***	0.103***	0.106***	0.094***
	(0.011)	(0.011)	(0.018)	(0.017)	(0.017)
Russian exp. × Banned prod.	-0.252***	-0.258***	0.363***	0.341***	0.390***
	(0.018)	(0.029)	(0.015)	(0.029)	(0.032)
Russian connections	0.005	0.004	-0.047***	-0.052***	0.013
	(0.013)	(0.013)	(0.013)	(0.014)	(0.018)
ripeff × dom		0.003		0.063***	0.066***
		(0.016)		(0.014)	(0.015)
Ripeff × non-sanctioned		0.007		0.035	0.039*
		(0.024)		(0.021)	(0.022)
Ripeff × (many destinations)					-0.093***
					(0.028)
Observations	42921	42921	44845	44845	44845
Adjusted R^2	0.84	0.84	0.21	0.21	0.21
VCE	cluster	cluster	cluster	cluster	cluster
Cluster variable	Dest	Dest	Dest	Dest	Dest
Fixed effects	ProdgrYear FirmProductDest	ProdgrYear FirmProductDest	ProdgrYear FirmProductDest	ProdgrYear FirmProductDest	ProdgrYear FirmProductDest

Notes: Figures in parentheses are clustered standard errors and stars indicates the level of significance (* 10%, ** 5% and *** 1%). The time-specific fixed effects vary across product groups (i.e. 3-digit CN-codes). The mismatch of number of observations compared to the total number of observations discussed in the data section depends on singletons, which are dropped in the analysis. Ripeff combines the effect of selling banned products and having Russian connections. The specification of market exit is based on the 2011-2015 period and exit is defined as the last observed year.

Table 4: Sanction effects on domestic production

	(1) Quantity (Excl. importers)	(2) Quantity (Incl. importers)	(3) Quantity, all prod. (Incl. importers)	(4) Price (Incl. importers)
Ripeff	0.015	-0.004	-0.066***	-0.065**
	(0.073)	(0.067)	(0.025)	(0.027)
Exporting banned products to Russia	-0.329***	-0.301***	-0.224***	0.039
	(0.080)	(0.074)	(0.084)	(0.045)
Observations	5431	6280	39243	6729
Adjusted R^2	0.95	0.95	0.96	0.96
Cluster variable	Firm	Firm	Firm	Firm
Fixed effects	ProdgrYear FirmProduct	ProdgrYear FirmProduct	ProdgrYear FirmProduct	ProdgrYear FirmProduct

Notes: Figures in parentheses are clustered standard errors and stars indicates the level of significance (* 10%, ** 5% and *** 1%). The time-specific fixed effects vary across product groups (i.e. 3-digit CN-codes). The mismatch of number of observations compared to the total number of observations discussed in the data section depends on singletons, which are dropped in the analysis. Ripeff combines the effect of selling banned products or having Russian connections.

To investigate the robustness of the results, column 4 of Table A.1 in the Appendix shows the results from the benchmark specification using all products instead of only food items. All results but one are almost identical. The sanction effect on exporters of banned products to the Russian market amounts to a drop in sales volumes of around 62% while the indirect effects on other markets due to selling products that were banned on the Russian market is, as before, a general drop of around 10%. The ripple effect from having Russian connections is, however, not visible when all products are used but this zero result hides a highly heterogeneous effect, as will be investigated in the next section.

I also investigate whether there are any pre-trends in the sanction effects in Table A.2 by combining the direct effects (i.e. combining R and PR) as well as the indirect effects (i.e. combining P and RC). The results in column 1 show that the combined effects are similar to the results discussed above and the results in column 2-5 support the findings in 1. That is, the sanctions were sudden and the sanction effects discussed above are not formed by a trend starting before 2014.

3.2 Heterogeneous effects

So far, I have established that the sanctions implemented after the Ukraine crisis had not only a negative impact on Swedish firms when it comes to export volumes on the Russian market,

but that these effects also spread to other markets as well as to domestic production. Firms responded differently, however, as discussed by Crozet and Hinz (2016) and Haidar (2017) in the context of sanctions and by Berman et al. (2015) in the context of more general exogenous export shocks. The mechanisms underscored by these studies were characteristics such as size, product type and firms' financial situation. Berman et al. (2015) found, for example, that the transmission of a market-specific shock within a firm was more pronounced for firms facing financial distress. The argument behind such a mechanism was that firms with a tighter financial constraint are more sensitive to a market-specific shock since it influences the firm's liquidity requirements.

Also Haidar (2017) emphasised that a firm's export response in one market may differ when they face similar sanctions in another market. He found a stronger response for larger and more experienced exporters, for core products and to markets where firms were already established. Haidar (2017) argued that this 'observation is consistent with the assumption that exporters have specific productivities and behave differently in export markets'. That larger and more experienced exporters redirected a greater export value to another market when they faced sanctions may reflect that they are more productive, as the dynamic model of Albornoz et al. (2012) suggests. A stronger redirection of exports of a core product may also reflect firms' ability to better compete with these products when the cost of exporting increases, (as discussed in Bernard et al. 2011; Mayer et al. 2014).

I investigate the possibility of a heterogeneous response on markets other than Russia by focusing on (1) export markets facing the same set of sanctions as Sweden, and (2) export destinations unaffected by sanctions (i.e. non-sanctioned countries) in Table 5, and (3) the domestic production in Table 6. The ripple effects are combined so that the estimated effect captures both the effect of firms exporting banned products and/or exporting to the Russian market.

To capture firms' vulnerability when it comes to a market-specific shock, I focus on three different characteristics: the firm size; a measure of financial distress; firms' core competence. The effect of firm size is captured by a binary indicator taking the value of 1 as long as the number of employees before 2014 was less than 250 (i.e. small and medium sized enterprises, SME). The financial distress is captured by the debt-to-equity ratio using firms' total assets

and their own capital.[25] Hence a higher debt-to-equity ratio indicates that firms were under a higher financial stress before the sanctions were implemented. I thereafter use this ratio to characterise firms with a higher debt-to-equity ratio than the 75th percentile as firms with a financial distress. Finally, I capture firms' non-core competence as products with a smaller share than 10% in total sales.[26]

The results in column 1 in Table 5 replicate the earlier sanction effects outside Russia (excluding the domestic market) using the combined ripple effect while the results in the other columns investigate the possibility of heterogeneous effects. Column 2 focuses on food products, and the results suggest that the sanction effects were borne by SMEs and financially constrained firms. The firm-level heterogeneity is, however, not robust to a change in the sample, as indicated by the results in column 3 and 4. Instead, I found that the heterogeneity in the sanction effect was more pronounced across different types of products. That is, the lack of ripple effects when all products are included or when I focus on non-sanctioned markets was hidden by a large negative impact on fringe products. Splitting the combined ripple effect into one capturing the impact of exporting banned products and one capturing the impact of exporting to Russia (see mid-section in column 3) explains the earlier result when it comes to the ripple effect due to Russian connections. That is, firms exporting banned products and/or to Russia respond by reducing the export volume of fringe products while their exporting of core products is unchanged.

The results on firms' domestic production are presented in Table 6 using the combined ripple effects of producing banned products or exporting to Russia, and the direct effect of exporting banned products to Russia. The results in column 1 mimic the effect of exporting banned products to Russia presented earlier, while the other columns (2-4) show the results using all producers, non-importing producers and all products, respectively. The overall picture is as before: the sanction effects differ across firm and product characteristics. Although the average effect of the counter-sanctions on the production is substantial (i.e. a 26% drop in produced volumes), the results suggest that these effects are highly skewed towards firms with financial distress and towards fringe products. Although firms' domestic production of fringe products is

[25]The debt-to-equity ratio is measured as ln([total assets/own capital]-1), using the mean values in the 2010-2013 period.

[26]I have also used the debt-to-equity ratio as well as the product shares in sales instead of transforming these firm characteristics into binary variables. The results are the same and they are also available upon request.

Table 5: Mechanisms behind firms' sales responses, quantities.

	(1) Food Excl. domestic	(2) Food Excl. domestic	(3) All prod. Excl. domestic	(4) Food Only non-sanctioned
Ripeff	-0.141***	0.153	0.028	-0.373
	(0.052)	(0.093)	(0.025)	(0.243)
Ripeff × sme		-0.113*	0.028	-0.166
		(0.065)	(0.017)	(0.224)
Ripeff × Financial distress		-0.171*	0.031	0.144
		(0.091)	(0.021)	(0.149)
Ripeff × Fringe product		-0.219***	-0.105***	-0.179**
		(0.044)	(0.020)	(0.084)
Results form separating the effect on fringe products.				
Fringe product				
× Banned products			-0.265***	
× Russian connection			-0.110***	
Observations	54751	54751	2584386	5630
Adjusted R^2	0.81	0.81	0.81	0.81
Cluster variable	Dest	Dest	Dest	Dest
Fixed effects	ProdgrYear FirmProduct-Dest	ProdgrYear FirmProduct-Dest	ProdgrYear FirmProduct-Dest	ProdgrYear FirmProduct-Dest

Note: Figures in parentheses are clustered standard errors and stars indicates the level of significance (* 10%, ** 5% and *** 1%). The time-specific fixed effects vary across product groups (i.e. 3-digit CN-codes). The mismatch of number of observations compared to the total number of observations discussed in the data section depends on singletons, which are dropped in the analysis. Ripeff combines the effect of selling banned products and having Russian connections.

sensitive to the negative effects, a highly important mechanism compared to the export decision is firms' financial situation.

3.3 Total sanction costs

To quantify the costs of sanctions in the wake of the Ukraine crisis, I use the same methodology as in Glick and Rose (2016) (also used by Crozet and Hinz 2016), which is based on a comparison between a normal sales level and a counterfactual one. And the counterfactual value is in this case based on the predictions from the following firm-level gravity equation:

$$z_{ipdt} = PR_{pdt} + R_{dt} + (P_{pt} + RC_{dt})(1 + X_i) + \alpha_{ipd} + \lambda_{st} + \epsilon_{ipdt}, \tag{3}$$

where PR, P, R and RC are the different treatment effects presented in Equation 1 while

Table 6: Mechanisms behind firms' production responses, quantities.

	(1) Food prod. All firms	(2) Food prod. All firms	(3) Food prod. Excl. importers	(4) All prod. Excl. importers
Ripeff	0.002	-0.004	-0.016	-0.033
	(0.071)	(0.071)	(0.074)	(0.029)
Export banned products	-0.315***	0.120	0.112	-0.070
to Russia (PR)	(0.076)	(0.165)	(0.170)	(0.151)
PR × sme		-0.255	-0.267	-0.109
		(0.164)	(0.180)	(0.169)
PR × Financial distress		-0.371***	-0.502***	-0.377***
		(0.115)	(0.121)	(0.121)
PR × Fringe product		-0.376**	-0.401***	-0.227*
		(0.156)	(0.147)	(0.138)
Observations	6305	6305	5438	28116
Adjusted R^2	0.95	0.95	0.95	0.96
Cluster variable	Firm	Firm	Firm	Firm
Fixed effects	ProdgrYear	ProdgrYear	ProdgrYear	ProdgrYear
	FirmProduct	FirmProduct	FirmProduct	FirmProduct

Notes: Figures in parentheses are clustered standard errors and stars indicates the level of significance (* 10%, ** 5% and *** 1%). The time-specific fixed effects vary across product groups (i.e. 3-digit CN-codes). The mismatch of number of observations compared to the total number of observations discussed in the data section depends on singletons, which are dropped in the analysis. Ripeff combines the effect of selling banned products or having Russian connections.

X is a matrix with the same firm characteristics as discussed in Section 3.2 (indicator of small and medium sized enterprises, indicator of financial distressed firms and an indicator of fringe products). The absolute loss in sales (EL) per firm, product and destination (which also includes the domestic one) is thereafter measured as the differences between the actual 2013 sales of each firm-product-destination with the predicted one ($e^{\hat{z}}$) using equation 3 and all relevant treatment effects activated. I thereafter calculate the export loss at firm-level (EL_i) by summing up the difference between actual export values in 2013 and the predicted one over products and destinations for firms facing at least one of the different sanction effects:

$$EL_i = \sum_d \sum_p (e^{z_{ipd,2013}} - e^{\hat{z}_{ipd,2013}}), \tag{4}$$

and I mitigate the potential impact of outliers on aggregate values by excluding firm-level export losses (EL_i) outside the range of 5-95 percentiles. Firm-level export losses are thereafter allocated to plant-level (EL_l), which gives me the opportunity to investigate the distribution of export losses across space for firms with more than one plant and I use plant-level workforce shares as the distribution key:

$$EL_l = (s_l^i) EL_i, \tag{5}$$

where $s_l^i = w_{li}/w_i$ and w_{li} is the number of employees in plant l belonging to firm i. Table 7 presents an overview of the sanction losses in three dimensions (nationwide, municipality and firm) using only products similar to those banned on the Russian market (restricted sample) as well as the full sample.

The first thing to notice is that the loss due to being a target and/or a sender of sanctions is, as expected, rather small at a country-level. The total annual loss amounts to little less than 1 billion SEK. A figure that is approximately 60% of the estimate for Sweden in Crozet and Hinz (2016).[27] I find, however, as in Crozet and Hinz (2016), that the lion's share of the total costs is related to the sender effect. The direct effect of being a target of the counter-sanctions is only estimated at around 10 million SEK, and the total effect within the narrow sample focusing on similar food products amounts to around 30 million SEK.

[27]Note however that any comparison of an aggregate loss will be influenced by how outliers are handled and the fact that this study includes domestic sales.

Table 7: Sales losses due to sanctions.

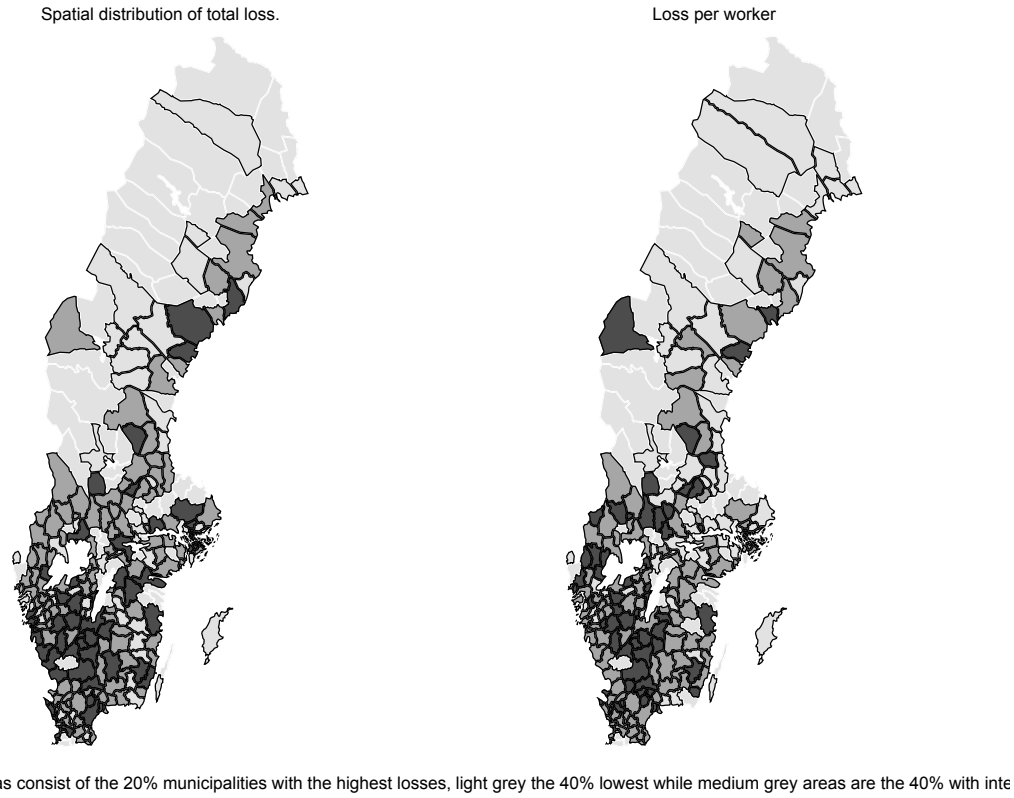
	Restricted sample			All products		
Export losses	Sweden	Municipality	Firm	Sweden	Municipality	Firm
SEK per worker						
Median	0	0	1,960	230	140	26,210
p75		0	18,600		490	90,170
% of value added						
Median	0	0	0.21	0	0.001	0.03
p75		0	0.39		0.01	0.12
% of sale						
Median	0	0	0.003	0	0	0.01
p75		0	0.02		0	0.04
SEK per worker						
Primary	0			0		
Manufacture	10			1,460		
Service	0			150		
Annual loss in SEK millions:						
Total loss				980		
Total loss		30				
Counter sanctions		10				

Note: Sales losses are based on firms that may be hurt by the sanctions initiated by the Ukraine crisis and excludes outliers outside the range of 10-90% percentiles. Losses in absolute values and shares smaller than 10 and not noted at the third decimal respectively are truncated to a zero value.

To put the total loss of sanctions in some perspective, I compare the total loss with the number of workers, sales and value added. This indicates that the sanctions had very little impact on the economy as a whole, since the loss becomes negligible in all these relative terms except for a rather small loss per worker, which is estimated at around 23 Euros (230 SEK).

The sanction effects vary however across municipalities and firms, and the loss for vulnerable municipalities or firms could be rather significant. That is, although the median municipality faced a modest loss of around 14 Euro (140 SEK) per worker, the municipality at the 75^{th} percentile faced a loss close to 50 Euro per worker and vulnerable firms lost as much as 9,000 Euro per worker. When the loss is compared to firms' value added or sales, the costs are rather insignificant, even in the most vulnerable municipalities, since the loss amounts to not more than around 1% of the total value added in the 75^{th} percentile. The loss is of course much more visible in firms facing these sanctions, and the loss may amount to 12% and 4% of value added and sales, respectively, in the most vulnerable firms.

Figure 2: Allocation of sales losses across municipalities.



In other words, the costs of the trade disputes with Russia are highly heterogeneous, and some pockets in the Swedish economy face substantial costs due to a loss in sales. This matters because a global shock that has an asymmetric impact on an economy, a shock that is contained within a narrow geographical area, may create local tensions, as unemployment and wages respond to such a negative shock (see Arnarson and Gullstrand (2016), Autor (2014), and Costinot and Rodríguez-clare (2013)). Figure 2 supports a highly heterogeneous effect across space when it comes to the total cost, as well as the cost per worker. The 20% most exposed municipalities are highlighted in dark grey, and the pattern supports a distinct spatial pattern. The most vulnerable municipalities when it comes to the sanctions against and from Russia are found in the South-Eastern part Sweden.

4 Conclusions

The literature on sanctions has a broad agenda, and covers not only an assessment of the total costs of sanctions but also how sanctions influence both the target as well as the sender economy.

The literature investigates how the costs may create internal dynamics within a country due to an asymmetric allocation across firms and space. I investigate all these aspects by using Swedish firms and the sanctions targeting Russia, as well as the counter-sanctions targeting, among others, Sweden in 2014.

I found that the annual loss in sales due to the sanctions implemented in the wake of the Ukraine crisis was around 1 billion SEK (around 100 million Euros) in 2013 prices, which implies that the cost was small or even negligible in comparison to overall Swedish GDP (which in 2013 amounted to around 4,000 billion SEK). Although the costs were small on a national level, they were highly concentrated in some firms, industries and municipalities.

I found a highly significant target effect (firms with exports of banned products to Russia fell by over 60%) and a smaller sender effect (firms exporting to Russia decreased their exports to other markets by approximately 10%). The average negative ripple effect on markets other than Russia was, however, mostly visible in Swedish export markets facing the same sanctions as Sweden while the domestic one and markets without sanctions remained intact. The sanction effects were also highly asymmetric between and within firms since the negative effect on sales were concentrated in firms with a high debt ratio and in fringe products. Firms' responses to the shocks invoked by these sanctions are therefore highly complex. The negative impact on domestic production is concentrated to vulnerable firms while the response in sales varies across firms' business. The core business, i.e. the domestic market and the most important products, remains intact while exports and fringe products are hurt.

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Appendix

Table A.1: Sanction effects on sales, alternative specifications

	(1) Quantity (Food products)	(2) Quantity (Food products)	(3) Quantity (Food products)	(4) Quantity (All products)
Banned products	-0.125**			-0.110**
	(0.050)			(0.013)
Russian exports	-0.468***	-0.494***	-0.494***	-0.261***
	(0.039)	(0.037)	(0.037)	(0.000)
Russian exports of banned products	-0.544***	-0.565***	-0.544***	-0.589***
	(0.082)	(0.071)	(0.078)	(0.000)
Russian connections	-0.129**			-0.033
	(0.065)			(0.251)
Banned products × domestic	0.197***			
	(0.058)			
Russian connection × domestic	0.035			
	(0.076)			
Banned products × non-sanctioned	0.095			
	(0.093)			
Russian connection × non-sanctioned	0.180*			
	(0.094)			
Ripeff		-0.186***	-0.054	
		(0.059)	(0.091)	
Ripeff × domestic		0.201***	-0.019	
		(0.035)	(0.074)	
Ripeff × non-sanctioned		0.183***	0.029	
		(0.070)	(0.121)	
Ripeff × non-producer			-0.223**	
			(0.104)	
Ripeff × domestic × non-producer			0.309***	
			(0.112)	
Ripeff × non-sanctioned × non-producer			0.258	
			(0.163)	
Observations	42921	42921	42921	2054093
Adjusted R^2	0.82	0.82	0.82	0.82
Cluster variable	Destination	Destination	Destination	Destination
Fixed effects	ProdgrYear Firm-ProductDest	ProdgrYear Firm-ProductDest	ProdgrYear Firm-ProductDest	ProdgrYear Firm-ProductDest

Notes: Figures in parentheses are clustered standard errors and stars indicates the level of significance (* 10%, ** 5% and *** 1%). The time-specific fixed effects vary across product groups (i.e. 3-digit CN-codes). The mismatch of number of observations compared to the total number of observations discussed in the data section depends on singletons, which are dropped in the analysis. Ripeff combines the effect of selling banned products and having Russian connections, and non-producers are firms not producing any products banned by the Russian government.

Table A.2: Pre-trends, quantities.

	(1) Sales	(2) Sales	(3) Sales (Excl. domestic)	(4) Production (Excl. importer)	(5) Production (Incl. importer)
Ripeff	-0.155***	-0.047	-0.037	0.014	0.045
	(0.054)	(0.058)	(0.054)	(0.098)	(0.085)
Ruseff	-0.615***	-0.457***	-0.700***	-0.357***	-0.318***
	(0.032)	(0.031)	(0.024)	(0.111)	(0.097)
pre_Ripeff		0.166***	0.193***	-0.002	0.019
		(0.043)	(0.041)	(0.057)	(0.055)
pre_Ruseff		0.247***	0.184***	-0.111	-0.112
		(0.034)	(0.020)	(0.074)	(0.079)
Observations	43588	43588	61681	5875	7541
Adjusted R^2	0.84	0.82	0.81	0.95	0.94
Cluster variable	Dest	Dest	Dest	Firm	Firm
Fixed effects	ProdgrYear FirmProduct-Dest	ProdgrYear FirmProduct-Dest	ProdgrYear FirmProduct-Dest	ProdgrYear FirmProduct	ProdgrYear FirmProduct

Notes: Figures in parentheses are clustered standard errors and stars indicates the level of significance (* 10%, ** 5% and *** 1%). The time-specific fixed effects vary across product groups (i.e. 3-digit CN-codes). The mismatch of number of observations compared to the total number of observations discussed in the data section depends on singletons, which are dropped in the analysis. Ripeff combines the effect of selling banned products or having Russian connections while the Ruseff combines the effects of exporting to Russia and exporting banned products to Russia.