estructuraeconòmica
ECONOMÍA APLICADA II

Reducing trade with Russia: Sanctions vs. reputation

by

Juan de Lucio

Raúl Mínguez

Asier Minondo

and

Francisco Requena

Working Papers in Applied Economics

WPAE-2024-2406

ECONOMÍA APLICADA II

VNIVERSITAT DE VALÈNCIA

Departamento de Estructura Económica (Economía Aplicada II), Facultad de Economía, Universitat de València
Avda dels Tarongers, s/n, 46022 – Valencia, Spain
Phone +34 96 382 83 49 / Fax +34 96 382 83 54
http://www.estructuraeconomica.es
e-mail: investigacion.estructura@uv.es

ISSN 2172-3036

Reducing trade with Russia: Sanctions vs. reputation*

Juan de Lucio† Raúl Mínguez‡ Asier Minondo§

Francisco Requena¶

January 22, 2024

Abstract

The invasion of Ukraine in February 2022 led the European Union to impose a wide range of economic sanctions on Russia. Parallel to this process, many multinational firms, due to reputational concerns, voluntarily decided to suspend their activities in Russia. This paper quantifies the impact of trade sanctions and the decision of firms to suspend activities on Spanish exports and imports with Russia. Using an event study methodology, we find that the decision of firms to suspend activities in Russia contributed to the reduction in exports and imports by 26% and 43%, respectively, while sanctions contributed by 9% and 21%, respectively. These figures highlight that firms' actions to protect their reputation can significantly complement sanctions in reducing the amount of trade with target countries.

JEL: F10, F14

Keywords: sanctions, reputation, Russian invasion of Ukraine, firm-level exports and imports, Spain.

*We thank the Department of Customs and Excise of the Spanish Tax Agency (AEAT) for providing Customs data and Aitor Garmendia for giving us the information about Spanish firms' subsidiaries in Russia. This research was conducted as part of the Project PID2021-122133NB-I00 financed by MCIN/AEI/10.13039/501100011033/FEDER, EU. We also gratefully acknowledge the financial support from the Basque Government Department of Education (IT1429-22) and from the Consellería de Educación, Universidades y Empleo (Generalitat Valenciana), Programa Prometeu 2023 (CIPROM/2022/50).

†de Lucio: Universidad de Alcalá. Pza. San Diego, s/n, 28801, Alcalá de Henares (Spain). Email: juan.delucio@uah.es.

‡Mínguez: Cámara de Comercio de España and Universidad Antonio de Nebrija. Calle de Santa Cruz de Marcenado, 27, 28015, Madrid (Spain). Email: rminguez@nebrija.es.

§Minondo: Corresponding author. Deusto Business School, University of Deusto, Camino de Mundaiz 50, 20012 Donostia - San Sebastián (Spain). Email: aminondo@deusto.es

¶Requena: Department of Economic Structure, University of Valencia, Avda. dels Tarongers s/n, 46022 Valencia (Spain). Email: francisco.requena@uv.es

1 Introduction

The Russian invasion of Ukraine in February 2022 led to a large increase in the scope and intensity of trade sanctions imposed by the European Union (EU) against Russia. At the end of 2023, 2,795 export and 3,151 import products out of 9,758 were affected by sanctions, representing 40% and 50% of the average annual pre-invasion (2019-2021) EU exports and imports from Russia, respectively. The scope of affected products and their sizable share in the EU-Russia bilateral trade justify the interest in quantifying the effect of trade sanctions on EU exports and imports with Russia. This interest is further explained by the fact that previous EU sanctions against Russia, motivated by the annexation of Crimea in 2014, had a relatively small effect on Russia's trade and small and heterogeneous impact on EU countries' trade (Syropoulos et al., 2023).

Few days after the Russian invasion of Ukraine, some multinational firms announced that they would suspend or reduce their activities in Russia. Their main motivation was the reputational damage they could suffer if they maintained economic ties with Russia (Balyuk and Fedyk, 2023). That is, firms feared that they would lose sales in other markets if they continued to operate in Russia.[1] According to the list developed by Yale's School of Management Chief Executive Leadership Institute (Yale CELI list), by December 2023, 1,028 companies had decided to permanently or temporarily suspend their activities in Russia.[2] These firm-level decisions may also lead to a reduction in trade with Russia. For example, multinational firms may stop exporting goods that were previously distributed by their subsidiaries in Russia or provide intermediate inputs to their factories in Russia. They may also decide to stop importing intermediate inputs or final goods from Russia. Since multinationals account for a large share of a country's trade, their decision to suspend activities in Russia is likely to have a detrimental effect on trade equivalent to or greater than that produced by sanctions.

This paper quantifies the effect of EU sanctions and the decision of firms to suspend activities in Russia on the trade of Spanish firms with Russia. First, we use the Yale CELI and Leave-Russia lists to identify companies that decided to withdraw or suspend activities in Russia after the invasion of Ukraine.[3] Second, we identify products, at the 8-digit Combined Nomenclature level (CN8), that were affected by a EU trade sanction against Russia after the invasion of Ukraine. Third, we identify the trade transactions of firms that suspended activities in Russia and those of firms that stayed in Russia before

[1] In some cases, the decision was also motivated by the pressure of employees who demanded their firms to take a stand against Russia. See "The Viral List That Turned a Yale Professor Into an Enemy of the Russian State" by Robb Mandelbaum, bloomberg.com, 6 December 2022 at https://www.bloomberg.com/news/articles/2022-12-06/list-of-companies-doing-business-in-russia-made-by-yale-professor?embedded-checkout=true.

[2] The list can be accessed at https://www.yalerussianbusinessretreat.com/.

[3] The latter list can be accessed at https://leave-russia.org/.

and after the invasion of Ukraine. Finally, we combine these three pieces of information and use an event study methodology to estimate the impact of trade sanctions and firms' decision to suspend activities in Russia on Spanish exports and imports from Russia.

Although some governments, such as the US, predicted that Russia would invade Ukraine, it seems safe to assume that Spanish firms could not anticipate the products that would be affected by EU sanctions after a potential invasion.[4] Furthermore, the fact that Spanish firms incurred large economic costs due to their decision to suspend activities in Russia suggests that they were not anticipating it before the Russian invasion of Ukraine.[5] These facts allow us to consider the Russian invasion of Ukraine as a quasi-natural experiment and to interpret our estimates as causal.

Our econometric estimates conclude that Spanish firms' exports to Russia of products affected by trade sanctions decreased by 53% after the invasion of Ukraine, relative to unaffected products. Sanctions on jet fuel, firearms, military, maritime, and products that could improve Russia's industrial capacity had a significant negative impact on exports. However, sanctions on dual-use, oil refining, aviation, and luxury goods did not reduce exports of these goods. Exports to Russia of firms that suspended activities in Russia decreased by 79% compared to exports of firms that did not suspend activities in Russia. According to our calculations, sanctions and the decision of firms to suspend activities in Russia reduced trade with Russia after the invasion of Ukraine by 9% and 21%, respectively. Therefore, the decision of firms to suspend activities in Russia had a larger negative impact on exports than EU sanctions.

Spanish imports of sanctioned products from Russia decreased by 84% after the invasion of Ukraine, compared to unsanctioned products. Sanctions on crude oil, products which generate significant revenues for Russia, and steel had a significant negative effect on imports. However, sanctions on coal and jewelry had no significant impact on imports. Imports from firms that suspended activities in Russia decreased by 77% after the invasion of Ukraine, compared to those of firms that remained in Russia. We conclude that sanctions and suspension contributed to reducing the value of imports by 21% and 43%, respectively. As in the case of exports, the contribution of the suspension of activities to the reduction in trade was greater than that of sanctions.

We also explore the entry and exit of Spanish firms from Russia after the invasion of Ukraine. We find that sanctions and suspension of activities had a negative effect on the probability that a firm would start exporting a new product to Russia and a positive

[4]For example, see "Biden Predicts Putin Will Order Ukraine Invasion, but "Will Regret Having Done It"" by David E. Sanger, nytimes.com, 19 January 2022 at https://www.nytimes.com/2022/01/19/us/politics/biden-putin-russia-ukraine.html.

[5]For example, see "La guerra en Ucrania acaba con más de 2.000 millones de negocio para empresas españolas" by Javier García Ropero, cincodias.elpais.com, 22 February 2023 at https://cincodias.elpais.com/companias/2023-02-22/la-guerra-en-ucrania-acaba-con-mas-de-2000-millones-de-negocio-para-empresas-espanolas.html.

effect on exiting the Russian market. Sanctions also significantly reduced the probability of starting to import from Russia and increased the probability of stopping importing from Russia. In contrast, we find that the suspension of activities had only a significant positive effect on the probability of stopping imports from Russia. Finally, we do not find evidence supporting the hypothesis that Spanish firms rerouted their trade with Russia through neighboring countries to circumvent sanctions and suspension decisions after the invasion of Ukraine.

Our paper makes two main contributions to the literature. First, this paper adds to the literature that analyzes the impact of EU sanctions against Russia on firm-level exports. Previous articles have focused on the sanctions that the EU imposed on Russia in the aftermath of the annexation of Crimea. Using French firm-level data for the period 2012-2014, Crozet and Hinz (2020) concluded that the 2014 EU sanctions against Russia had no significant effect on exports of well-known brands. However, they had a strong negative effect on products that relied on trade finance instruments. In a later paper, Crozet et al. (2021) found that the 2014 EU sanctions against Russia reduced the probability that French firms exported to that country. Using Swedish firm-level data for the period 2010-2016, Gullstrand (2020) found that Russia's retaliatory measures against EU products after the 2014 EU sanctions had a strong negative effect on Swedish exports to Russia at intensive and extensive margins. Finally, using Dutch firm-level data for the period 2010-2020, Kohl et al. (2023) showed that EU export restrictions on oil refining products and arms led to a reduction in the exports of these products to Russia by Dutch firms. They also found that Russia's retaliatory measures had a strong negative effect on Dutch exports to that country. We contribute to this literature by estimating the impact of the trade sanctions imposed by the EU on Russia after the invasion of Ukraine. This episode is interesting because the range of products affected by trade sanctions was much wider than in the previous EU-Russia sanctions package. We show that sanctions had a strong negative effect on Spanish firm-level exports to Russia. Furthermore, in contrast to previous firm-level studies that focused exclusively on exports, we show that trade sanctions also had a strong negative impact on imports.

Second, we contribute to the broader literature on the impact of sanctions (Felbermayr et al., 2021; Meyer et al., 2023; Morgan et al., 2023), comparing the effect of these instruments with that of the voluntary decision of firms to suspend activities in the target country. These firm-level decisions link our paper to the broad literature on corporate social responsibility (Bowen, 2013), and to a narrower literature which analyzes how fear of losing reputation can drive firms' trade decisions (Koenig and Poncet, 2022). We find that firms' decision to suspend activities in a foreign country due to reputational concerns has a stronger negative impact on trade than trade sanctions.

The rest of the paper is organized as follows. The next section explains how we

combine information on firms that decided to suspend activities in Russia, EU trade sanctions, and Spanish firm-level data to build our data set. This section also describes the evolution of Spanish trade flows with Russia by sanction and suspension categories. This analysis provides initial evidence on the impact of sanctions and suspension of activities on Spanish trade flows with Russia after the invasion of Ukraine. Section 3 introduces the difference-in-differences regressions and reports the estimates of the impact of sanctions and suspension of activities on Spanish exports and imports from Russia. This section also examines how sanctions and suspension affect firms' decision to enter or exit the Russian market. Section 4 explores whether firms rerouted their trade with Russia through neighboring countries to circumvent sanctions or smooth out the negative effects of suspension. The last section concludes.

2 Data and stylized facts

Our data set combines three pieces of information. First, we use the Yale CELI and KSE Institute's Leave-Russia lists to identify the Spanish firms that voluntarily decided to stop their activities in Russia. We consider that a firm voluntarily decided to curtail operations in Russia if it is included in the Yale CELI list with the "Withdrawal" or "Suspension" status or in the KSE's Institute's Leave-Russia list with the "Exited" or "Leave" status. As explained in Sonnenfeld et al. (2022), withdrawal is defined as "making a clean break/permanent exit from Russia or and/or leaving behind no operational footprint" and suspension as "temporarily suspending all or almost all Russian operations without permanently exiting or divesting".[6] If there is a discrepancy between the two lists on the suspension status of a firm, following a prudence criterion, we define that the firm continues its operations in Russia.

Second, we use the timeline on EU restrictive measures against Russia over Ukraine developed by the Council of the EU to trace the trade sanctions imposed by the EU against Russia since the invasion of Ukraine in February 2022.[7] Table A.1 in the appendix provides the date when each trade sanction package was introduced, the affected trade flow (exports or imports) and the products targeted by the trade sanction. The EU had imposed 11 rounds of sanctions against Russia until November 2023. Export bans or restrictions were imposed on oil refining, aviation and space, military and defense,

[6] As explained in Mylovanov et al. (2023), the KSE Institute defines Exited as "companies that sold their business/assets or its part of the business to a local partner/terminated relations and left the market. Also, for companies that are being liquidated, this status is being assigned." Leave is defined as "companies that have published on the company's official website (or their release has appeared in a foreign publication such as FT, NYT, etc.) that are completely shutting down in Russia or companies that have officially announced that they are temporarily reducing operations in Russia.

[7] This timeline can be accessed at https://www.consilium.europa.eu/en/policies/sanctions/restrictive-measures-against-russia-over-ukraine/history-restrictive-measures-against-russia-over-ukraine/.

dual use, maritime navigation, and luxury goods, products that could enhance Russia's industrial capacity, and firearms and their parts. Products affected by import bans and restrictions were iron and steel, coal, wood, cement, seafood, liquor, crude oil and petroleum products, gold, jewelry, wood pulp and paper, cigarettes, plastics, cosmetics, asphalt, and synthetic rubber.[8] Using information published in different editions of the EU Official Journal and the list of dual-use goods available at the EU Communication and Information Resource Center for Administrations, Businesses, and Citizens (CIRCABC)[9], we built a data set of products affected by a trade sanction, identifying the product's CN8 code, the sanction regime (e.g., luxury goods), the affected trade flow (exports or imports), and the date the sanction entered into force.

In March 2022, Russia imposed an export ban on telecommunication and medical equipment, vehicles, agricultural machinery, electric equipment, as well as railroad cars and locomotives, containers, turbines, metal and stone cutting machines, video displays, projectors, consoles, switchboards, and some forest products.[10]

Third, confidential data on international transactions in goods by Spanish firms were made available to us by the Department of Customs of the Spanish Tax Agency (AEAT-Customs). Each record reports the value (in euros) of exports or imports for each firm, by CN8 product, country of destination or origin, year, and quarter. Our data set includes all Spanish firms that traded at least one quarter with Russia during the period 2019q1-2023q3. AEAT-Customs identifies firms with an anonymized code. Following the procedure explained in de Lucio et al. (2018), we identified by name 64% and 41% Spanish firms that exported and imported from Russia during that period, respectively: 2,734 exporters and 982 importers. These firms represented 91% and 93% of Spanish exports and imports from Russia during the pre-invasion period, respectively. Among them, we identified 64 companies that suspended activities in Russia after the invasion of Ukraine: 28 firms exported and imported from Russia, 18 only exported to Russia, and 18 only imported from Russia. These firms had their headquarters in Spain or belonged to foreign firms that suspended activities in Russia. We also identified 69 companies operating in Spain that had stayed in Russia according to Yale CELI or Leave-Russia lists:

[8]The EU only introduced a package of trade sanctions against Russia after the Annexation of Crimea in July 2014. It included an export ban on dual-use goods and technologies intended for military use, prior authorization for the export of technologies related to oil exploration and production, and an export and import ban of items included in the EU common military list. In August 2014, Russia took retaliatory measures, banning the import of some EU food products. These sanctions and counter-sanctions remained in force until the time of writing this paper.

[9]This list, which is updated every year, can be accessed at https://circabc.europa.eu/ui/group/0e5f18c2-4b2f-42e9-aed4-dfe50ae1263b/library/c3d06bd7-6ef0-4771-bbd7-f92b976ae9a0.

[10]The Russian government decision can be accessed at http://government.ru/en/docs/44762/. We were unable to find a list specifying the CN8 products affected by the Russian export ban. Therefore, we created a list based on the description of the products included in the decision of the Russian government. The export ban list includes products that were also sanctioned by the EU. In case of duplication, we removed the product from the list of products whose exports were banned by Russia.

16 firms exported and imported from Russia, 38 only exported to Russia, and 15 only imported from Russia. For the remaining firms that are not included on the Yale CELI or Leave-Russia lists (238 two-way traders, 2,396 only exporters, and 667 only importers), we assumed that they have not voluntarily suspended activities in Russia. Therefore, our suspension of activity estimates should be considered as a low bound.

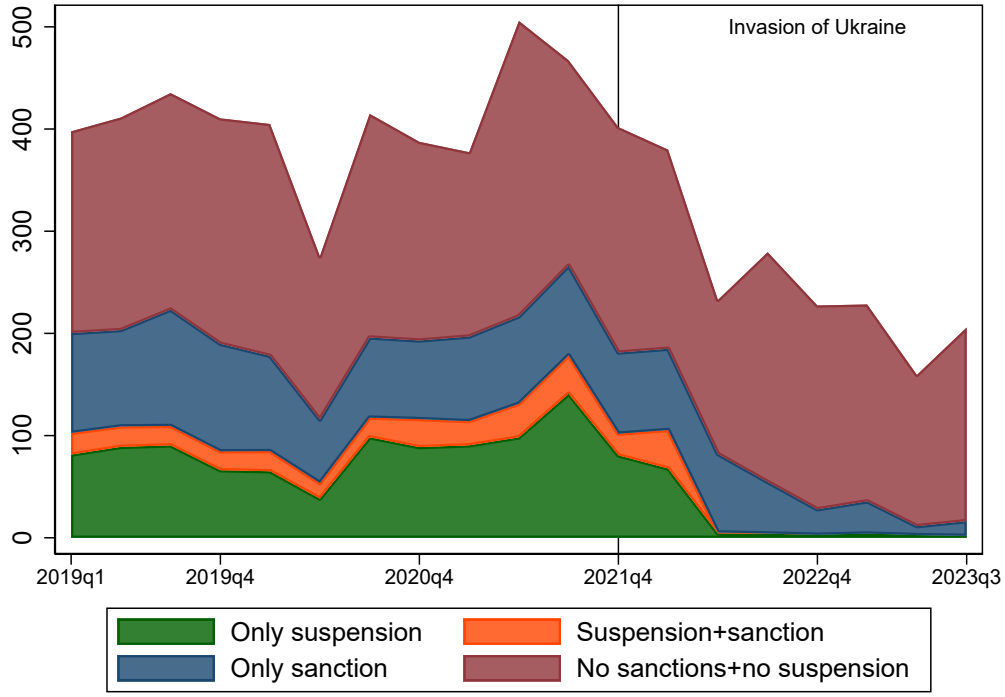
Table A.2 in the appendix shows that the firms that suspended activities in Russia were much larger in terms of export and import value, number of products traded, and number of destinations/origins than the rest of the Spanish traders with Russia. This result is explained by the fact that the firms that suspended activities in Russia had commercial or productive subsidiaries in that country. As shown in Helpman et al. (2004), firms that invest in foreign markets are more productive and larger than those that only trade. Importers who suspended activities in Russia were larger than exporters that suspended activities in Russia, especially when looking at trade flows with Russia. This is explained by the presence of oil and gas importers, which have larger trade flows than other traders.

The average annual Spanish exports and imports to Russia during the pre-invasion period (2019-2021) were equal to 1,630 and 3,749 million euros, respectively (0.6% of total Spanish exports and 1.3% of total Spanish imports). During the pre-invasion period, Russia occupied the 29th and the 18th positions in the ranking of Spanish export and import partners, respectively. Panel A of Figure 1 shows the evolution of Spanish quarterly exports to Russia by firm-product groups between 2019q1 and 2023q3. The first group (green area; Only suspension) is exports of products unaffected by sanctions from firms that suspended activities in Russia after the invasion of Ukraine. The second group (orange area; Suspension+sanction) is exports of products affected by sanctions from firms that suspended activities in Russia after the invasion of Ukraine. The third group (blue area; Only sanction) is exports of products affected by trade sanctions from firms that did not suspend activities in Russia. The fourth group (red area; No sanctions+no suspension) is exports of products unaffected by sanctions from firms that did not suspend activities in Russia.

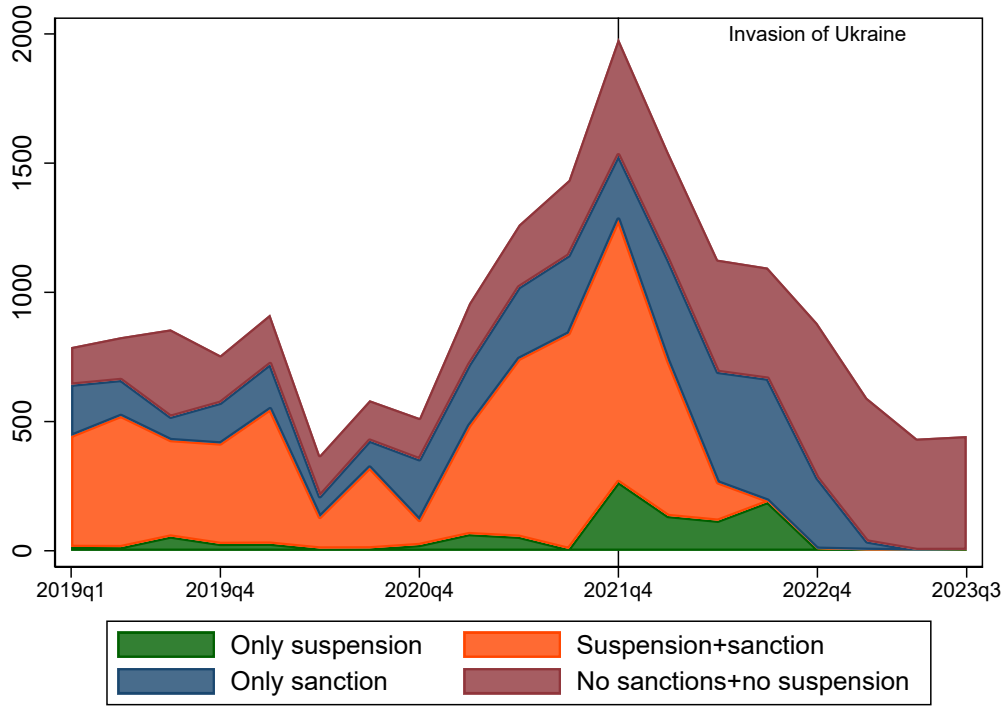
During the pre-invasion period (2019q1-2021q4), on average, annual exports from firms that suspended activities in Russia after the invasion of Ukraine represented 27% of total exports to Russia. Twenty-one percentage points corresponded to products unaffected by sanctions and six percentage points to products affected by them. Therefore, more than three-quarters of the exports of firms that suspended activities in Russia after the invasion of Ukraine were unaffected by sanctions. Sanctioned products not exported by firms that suspended activities represented 21% of total Spanish exports to Russia in the pre-invasion period. Finally, exports of products unaffected by sanctions and exported by firms that did not suspend activities in Russia represented 52% of total Spanish

Figure 1: Quarterly Spanish trade with Russia by firm-product groups, 2019q1-2023q3 (million euros)

A. Exports



B. Imports



Source: authors' own elaboration using data from AEAT-Customs.

exports to Russia during the pre-invasion period.

After reaching a maximum in 2021q2, total exports from Spain to Russia declined during the last two quarters of 2021 and throughout the invasion period. If we compare the post-invasion period (2022q1-2023q3) with a pre-invasion period with the same length and same start and end quarters (2020q1-2021q3), the value of exports decreased by 40%. There is a large decrease in exports from firms that suspended activities in Russia after the invasion of Ukraine, and they almost disappeared in the third quarter of 2023. There is also a large reduction in exports of sanctioned products from firms that did not suspend activities in Russia. Between the pre-invasion and the above-defined post-invasion period, exports of these goods decreased by 49%. There is also a decrease in exports of unsanctioned goods from firms that did not suspend activities in Russia. This decrease can be explained by the negative effect on exports of sanctions that were not targeted on specific products, such as the SWIFT ban on some Russian banks. Furthermore, similar to Crozet and Hinz (2020), the conflict itself could have increased the risk of trading with Russia, leading to a reduction in exports to this country. In any case, the decrease in exports in this last group was less pronounced than in the previous groups: 12% between the pre-invasion and post-invasion periods defined above. This latter result suggests that trade sanctions and the decision of firms to suspend activities in Russia had a *particularly* negative effect on Spanish exports to Russia after the invasion of Ukraine.

Panel B of Figure 1 shows the evolution of Spanish imports from Russia. The graph shows a sharp increase in imports between the last quarter of 2020 and the last quarter of 2021. This increase is explained by the rise in the price of oil, a product that represented almost two-thirds of Spanish imports from Russia in 2021. Imports from firms that suspended activities in Russia represented 56% of all Spanish imports from Russia in the pre-invasion period, of which 5 percentage points corresponded to unsanctioned products (green area) and 51 percentage points to sanctioned products (orange area). Therefore, in the case of imports, most of the products traded by firms that suspended activities were also affected by sanctions. Imports of sanctioned products from firms that did not suspend activities in Russia represented 20% of Spanish imports during the pre-invasion period (blue area). Finally, imports of unsanctioned products from firms that did not suspend activities in Russia represented 24% of total Spanish imports from Russia during the pre-invasion period.[11]

There is a sharp decrease in the value of imports after the invasion of Ukraine. However, if we compare the pre-invasion period (2020q1-2021q3) and the post-invasion period (2022q1-2023q3) defined above, Spanish imports from Russia *increased* by 1%. Imports from firms that suspended activities (green and orange areas) and imports of sanctioned

[11] In the case imports, there is an additional category: products whose exports were banned by Russia. Since the value of these products is very small, we have not plotted them on the imports graph; instead, we have added their share in total imports to the Only sanctions group (blue area).

products from firms that did not suspend activities in Russia (blue area) almost disappeared by the third quarter of 2023. In contrast, imports of unsanctioned products and from firms that did not suspend activities in Russia *increased* by 130% between the pre-invasion and post-invasion periods. This increase is explained by imports of liquefied natural gas, a product that represented 49% of all Spanish imports from Russia in the post-invasion period and whose average price increased after the invasion of Ukraine.

Import trends also suggest that trade sanctions and the decision of firms to suspend activities in Russia had a negative impact on Spanish trade with Russia. To confirm visual perception, the next section uses econometric techniques to estimate the impact of sanctions and firms' voluntary decision to suspend activities in Russia on Spanish firms' trade with Russia after the invasion of Ukraine.

3 Trade impact of sanctions and the voluntary decision of firms to suspend activities in Russia

This section is divided into three parts. First, we explain the difference-in-difference strategy used to identify the impact of sanctions and suspension of activities on Spanish trade with Russia after the invasion of Ukraine. Second, we present the baseline estimations of the impact of sanctions and firms' voluntary decision to suspend activities in Russia on the value of Spanish trade with Russia. Finally, we analyze the robustness of our estimates.

3.1 Methodology

We use the following specification to estimate the effect of EU sanctions and the decision of firms to suspend activities on Spanish firms' trade flows with Russia:

$$y_{fkt} = exp(\sum_{i} \alpha_i(Sanction_k^i \times Post_t^i) + \beta(Suspension_f \times Post_t) + \gamma_{fk} + \gamma_t) * \epsilon_{fkt} \quad (1)$$

where y_{fkt} is the value of firm f trade flow (exports or imports) of product k with Russia in time t. Time is defined at the year-quarter level (e.g., 2022q1). $Sanction_k^i$ is an indicator variable that turns 1 if the traded product was subject to the trade sanction i (e.g., oil refining) imposed by the EU against Russia after the invasion of Ukraine. $Post_t^i$ takes the value of 1 if the trade flow occurred in the year-quarter when sanction i was imposed or later. $Suspension_f$ is an indicator variable that turns 1 if firm f suspended activities in Russia after the invasion of Ukraine. $Post_t$ turns 1 if the trade flow occurred in the year-quarter when Russia invaded Ukraine or later. We set the same

$Post_t$ variable for firms that suspended activities in Russia, because we assume that all firms began considering whether to suspend activities in Russia in the year-quarter when Russia invaded Ukraine (2022q1).[12] Subsequently, firms may have needed different times to conclude the suspension of activities. In any case, we show later that the results are robust to using a firm-specific date to mark the beginning of the suspension process. γ_{fk} is a firm-product fixed effect, that controls factors, such as average productivity or production capacity, that can affect the export or import of product k by firm f from Russia. Since this fixed effect includes the product dimension (k), it absorbs the effect of the trade sanctions that the EU imposed against Russia and the counter-sanctions that Russia introduced against the EU after the Annexation of Crimea in 2014, and which remained in force during our period of analysis. γ_t is a time fixed effect, which captures all time-variant factors, such as the Covid-19 pandemic, the euro-ruble exchange rate, or Russia's GDP, that affect trade flows between Spain and Russia. ϵ_{fkt} is the disturbance term.

Equation (1) uses a difference-in-differences strategy to identify the effect of sanctions (α) and suspension of activities (β) on Spanish firms' exports to Russia. α captures whether the difference in a firm's exports to Russia between a product affected by a trade sanction and another unaffected by a trade sanction (first difference) changed between the post-invasion and the pre-invasion period (second difference). β captures whether the difference in exports of product k between a firm that suspended activities in Russia and another that did not (first difference) changed between the post-invasion period and the pre-invasion period (second difference). The interpretation of these coefficients is similar if the analyzed trade flow is imports.

The difference-in-differences methodology is based on the assumption that the control group provides a good approximation of what would have occurred to the treated group if the Russian invasion of Ukraine had not occurred. This assumption seems reasonable if the treated and control groups followed similar trends before the invasion. Panels A and B of Figure 1 suggest that the treated and control groups followed similar trends before the Russian invasion of Ukraine. Furthermore, as explained later, the quarterly pre-invasion coefficients confirm the parallel trends' assumption.

Equation (1) allows us to estimate the *average* effect that a trade sanction and a firm's decision to suspend activities in Russia have on trade during the period in which these actions are in force. To explore whether the impact of these actions changes over the period in which they are in force, we estimate a specification that includes interaction terms for each quarter included in the sample period (2019q1-2023q3):

[12]For example, on 2 March 2022, less than two weeks after the invasion, the garment retailer H&M announced that it would suspend activities in Russia. The press release is available at https://hmgroup.com/news/hm-group-temporarily-pauses-all-sales-in-russia/. Many other companies also announced the suspension of activities throughout March 2022.

$$y_{fkt} = exp(\sum_{i}\sum_{t}(\alpha_{it}(Sanction_{k}^{i} \times D_t)) + \sum_{t}\beta_t(Suspension_f \times D_t) + \gamma_{fk} + \gamma_t) * \epsilon_{fkt} \quad (2)$$

where D_t is an indicator variable that turns one if the analyzed year-quarter is t. We select 2021q4, the quarter just before the Russian invasion of Ukraine (24 February 2022), as the excluded category.

Since we use high-frequency trade data, there are many observations in which the value of the trade flow is zero. Furthermore, due to firms' decision to suspend operations in Russia or because trade operations became unprofitable after the invasion, the number of zero trade flows increases in the last year-quarters of our data set. To incorporate zero-valued trade flows into our empirical analysis, we estimate Equations (1) and (2) using a Poisson pseudo-maximum likelihood estimator (Santos-Silva and Tenreyro, 2010).[13] We cluster standard errors at the product level.

3.2 Econometric Results

Table 1 reports the results of the econometric analysis on the impact of EU sanctions and the suspension of activities by firms on Spanish exports to Russia. Column 1 groups all sanctions into an indicator variable that turns one if product k was affected by any trade sanction. We estimate Equation (1) only with this variable. The sanction coefficient is negative and statistically significant, indicating that trade sanctions had a negative effect on Spanish firm-level exports to Russia. Specifically, exports of products affected by sanctions decreased by 50% [(1-exp(-0.688)] relative to products unaffected by sanctions after the invasion of Ukraine.

Column 2 adds the suspension variable to the regression equation. The suspension coefficient is negative and statistically significant, indicating that a firm's decision to suspend activities in Russia led to a severe reduction in exports to this country. According to our estimation, exports from a firm that suspended activities in Russia decreased by 79% [1-exp(-1.549)] compared to firms that did not suspend activities in Russia after the invasion of Ukraine. Different reasons explain why the suspension of activities did not lead to a 100% reduction in exports from firms that adopted this measure. First, the suspension coefficient measures the effect of this action once we have controlled the impact of sanctions. If firms that suspended activities exported sanctioned products, the decrease in exports to Russia could not be fully attributed to the suspension of activities. Second, firms that decided to suspend activities in Russia may have needed some time to terminate

[13] We use Stata's ppmlhdfe command (Correia et al., 2020).

Table 1: Impact of reputation and sanctions on Spanish firms' exports to Russia

	Value			Quantity	Price
	(1)	(2)	(3)	(4)	(5)
$\text{Sanction}_k \times \text{Post}_t^i$	-0.688^b	-0.760^a			
	(0.301)	(0.277)			
$\text{Suspension}_f \times \text{Post}_t$		-1.549^a	-1.568^a	-0.689^b	-0.333
		(0.211)	(0.212)	(0.321)	(0.309)
$\text{Dual use}_k \times \text{Post}_t^i$			1.835^a	3.574^a	0.008
			(0.521)	(0.696)	(0.377)
$\text{Oil refining}_k \times \text{Post}_t^i$			-0.718	0.316	-0.658^b
			(0.690)	(0.620)	(0.328)
$\text{Aviation}_k \times \text{Post}_t^i$			-0.231	0.127	-0.205
			(0.906)	(1.007)	(0.473)
$\text{Military}_k \times \text{Post}_t^i$			-5.827^a	-8.128^a	-1.914^a
			(0.647)	(0.556)	(0.340)
$\text{Maritime}_k \times \text{Post}_t^i$			-1.477^a	-0.806	0.027
			(0.538)	(0.648)	(0.251)
$\text{Luxury}_k \times \text{Post}_t^i$			0.216	0.808^c	0.503
			(0.168)	(0.441)	(0.350)
$\text{Industrial}_k \times \text{Post}_t^i$			-1.483^a	-1.650^a	0.161
			(0.269)	(0.229)	(0.259)
Observations	218861	218861	218827	218827	42723
Pseudo-R2	0.734	0.741	0.743	0.836	0.839

Note: The dependent variable is the quarterly value of exports. All estimations include a firm×product, a time fixed effect, and a constant. Standard errors clustered at the product level are in parentheses. a, b, and c: statistically significant at 1%, 5%, and 10%, respectively.

their activities in that country. Therefore, we can observe export operations despite the decision of a firm to suspend activities in Russia. As shown in Panel A of Figure 1, exports of firms that suspended activities decrease as we progress through the post-invasion period. The sanction coefficient remains negative and statistically significant. According to the new estimate, the exports of products affected by sanctions decreased by 53% [(1-exp(-0.760)] compared to products unaffected by sanctions after the invasion of Ukraine.

We use the coefficients reported in column 2 to quantify the contribution of sanctions and suspension of activities to the total decrease in Spanish exports to Russia after the invasion of Ukraine (Panel A of Table 2). First, we predict the average amount of quarterly exports in the post-invasion period if the EU had not imposed product-specific sanctions and firms had not suspended activities in Russia (No sanctions&no suspension): 343 million euros. Second, we predict the value of post-invasion exports if the

EU had imposed product-specific sanctions, but firms had not suspended activities in Russia (Only sanctions): 312 million euros. Third, we calculate the difference between the No sanctions&no suspension and Only sanctions predictions: 343 million euros-312 million euros=31 million euros. Dividing the latter figure by the No-sanctions&no suspension prediction (31/343), we see that sanctions reduced the predicted post-invasion No sanctions&no-suspension exports by 9% (column 4). The last row reports the predicted value of the post-invasion exports if the EU had not imposed product-specific sanctions but firms had suspended activities in Russia (Only suspension): 271 million. Applying the procedure described above, we find that the suspension of activities in Russia reduced the predicted post-invasion No sanctions&no suspension exports by 21% (72/332). Therefore, our calculations show that the contribution of suspension to the total reduction of exports was more than twice that of sanctions.

Table 2: Contribution of sanctions and suspension to the decrease in the Spanish trade with Russia after the invasion of Ukraine (average quarterly; million euros)

A. Exports			
Variable	Post-invasion	Difference to No sanctions&no suspension	% of No sanctions&no suspension
No sanctions&no suspension	343		
Only sanctions	312	31	9
Only suspension	271	72	21
B. Imports			
Variable	Post-invasion	Difference to No sanctions&no suspension	% of No sanctions&no suspension
No sanctions&no suspension	1,978		
Only sanctions	1,460	518	26
Only suspension	1,126	852	43

Note: We predict the value of quarterly exports (imports) in three different scenarios (1: No sanctions&no suspension [benchmark]; 2: Only sanctions; and 3: Only suspension) using Equation (1) as estimated in column 2 of Tables 1 and 3. Source: authors' calculations using data from AEAT-Customs and the estimates of column 2 of Tables 1 and 3.

Column 3 of Table 1 presents the estimates for each sanction category. The coefficients for military and maritime products and for goods that can enhance Russia's industrial capacity are negative and statistically significant. Exports of military goods almost disappeared after the invasion, while they decreased by 77% for maritime and industrial goods.[14]. Sanctions did not have a significant effect on Spanish exports of oil refining, aviation, and luxury products. Surprisingly, we find that despite sanctions, exports of

[14]There are two sanction categories, jet fuel and firearms, whose coefficient could not be estimated, because there were no exports of these goods after the invasion. In any case, we can conclude that sanctions on jet fuel and firearms were fully effective, since they eliminated exports of these products

dual-use goods increased after the invasion.[15]

In columns 4 and 5 of Table 1, we explore whether the change in the value of Spanish firm-level exports to Russia after the invasion of Ukraine was explained by a change in quantities or prices. Column 4 shows that there was a significant decrease in export quantities by firms that suspended activities in Russia. Export quantities also fell significantly for military and industrial products. In contrast, there was a significant increase in exported quantities for dual-use and luxury goods. Column 5 reports the coefficients when price is the dependent variable.[16] We should take these coefficients with care because they are estimated with a sample that only includes trade transactions with positive prices; that is, the sample does not include zero-value transactions. The invasion of Ukraine led to a significant decrease in the export price of oil refining and military products.

Column 1 of Table 3 presents the overall impact of EU sanctions on imports from Russia. The sanction coefficient is negative and statistically significant, indicating that EU sanctions decreased Spanish imports from Russia after the invasion of Ukraine. Specifically, imports of products affected by sanctions decreased by 88% [1-exp(-2.110)] relative to unaffected products after the invasion of Ukraine. The estimation in column 1 also includes the effect of Russia's export ban. Products affected by this measure experienced a 92% [1-exp(-2.477)] decrease in imports relative to unaffected products after the invasion of Ukraine.

Column 2 adds the suspension coefficient. It is negative and statistically significant, indicating that firms that decided to suspend activities in Russia reduced imports from that country. Specifically, imports by firms that decided to suspend activities in Russia decreased by 77% [1-exp(-1.479)] relative to firms that decided to stay in that country after the invasion of Ukraine. It is important to note that this percentage does not include the effect that sanctions and export bans had on the import of firms that suspended their activities in Russia. The sanctions and export ban coefficients remain negative and statistically significant. According to the sanction coefficient reported in column 2, imports of products affected by sanctions decreased by 84% [1-exp(-1.831)] relative to unaffected products after the invasion of Ukraine.

As in exports, we use the coefficients in column 2 to quantify the contribution of sanctions and suspension of activities to the decrease in Spanish imports from Russia after the invasion of Ukraine. Panel B of Table 2 shows that if the EU had not imposed any product-specific sanctions and firms had not suspended activities in Russia after the invasion (No sanctions&no suspension), the predicted value of quarterly imports would have been 1,978 million euros. If the EU had imposed product-specific sanctions but firms

[15]The positive coefficient is explained by large export values in 2022q1, 2022q2 and 2022q3. Subsequently, the exports of dual-use goods are similar to those before the invasion of Ukraine.

[16]Price is calculated dividing the export value by the exported quantity (in kilograms).

Table 3: Impact of reputation and sanctions on Spanish firms' imports from Russia

	Value			Quantity	Price
	(1)	(2)	(3)	(4)	(5)
$\text{Sanction}_k \times \text{Post}_t$	-2.110^a	-1.831^a			
	(0.756)	(0.641)			
Russia's export $\text{ban}_k \times \text{Post}_t$	-2.477^a	-2.129^a	-2.153^a	-0.811	0.565^b
	(0.870)	(0.633)	(0.637)	(0.875)	(0.228)
$\text{Suspension}_f \times \text{Post}_t$		-1.479^a	-1.365^a	-1.146^a	0.219
		(0.220)	(0.223)	(0.162)	(0.240)
$\text{Coal}_k \times \text{Post}_t^i$			-0.326	-0.613^c	1.176^a
			(0.416)	(0.362)	(0.237)
$\text{Crude oil}_k \times \text{Post}_t^i$			-3.902^a	-4.079^a	-0.793^b
			(0.930)	(1.060)	(0.353)
$\text{Jewelry}_k \times \text{Post}_t^i$			0.211	0.506	0.000
			(0.332)	(0.318)	(.)
$\text{Revenue}_k \times \text{Post}_t^i$			-1.901^a	-1.504^a	1.032
			(0.339)	(0.326)	(0.712)
$\text{Steel}_k \times \text{Post}_t^i$			-5.087^a	-5.088^a	2.051^c
			(0.879)	(0.980)	(1.134)
Observations	38380	38380	38380	38380	5379
Pseudo-R2	0.848	0.858	0.862	0.876	0.874

Note: The dependent variable is the quarterly value of imports. All estimations include a firm×product, a time fixed effect, and a constant. Standard errors clustered at the product level are in parentheses. a, b, and c: statistically significant at 1%, 5%, and 10%, respectively.

had not suspended activities in Russia (Only sanctions), the quarterly value of imports would have been 1,460 million euros. Therefore, sanctions reduce the amount of imports relative to the No sanctions&no suspension scenario by 518 million euros (column 3). This figure represents 26% of the imports predicted in the No sanctions&no suspension scenario (518/1,978). If the EU had not imposed product-specific sanctions, but firms had suspended activities in Russia (Only suspension), post-invasion quarterly imports would have amounted to 1,126 million euros. Following the same procedure as above, we find that suspension reduces the No sanctions&no suspension imports by 43% (852/1,978). As was the case in exports, the contribution of suspension to the decrease in imports is greater than that of sanctions.

Column 3 estimates the coefficients for each sanction category.[17] Sanctions had a significant negative effect on the import of crude oil and petroleum products (crude oil for short), the main product imported by Spain from Russia before the invasion. Imports

[17]Gold is excluded because no firm in our sample imported gold from Russia during the post-invasion period.

of crude oil decreased by 98% [exp(-3.902)-1], compared to other unsanctioned imports, after the invasion of Ukraine. In fact, crude oil imports reached zero in the second quarter of 2022, when the import ban was fully implemented.[18] There was also a significant decrease in imports of goods that generated significant revenue for Russia (e.g., caviar) and steel. Sanctions had no significant impact on the import of coal and jewelry.

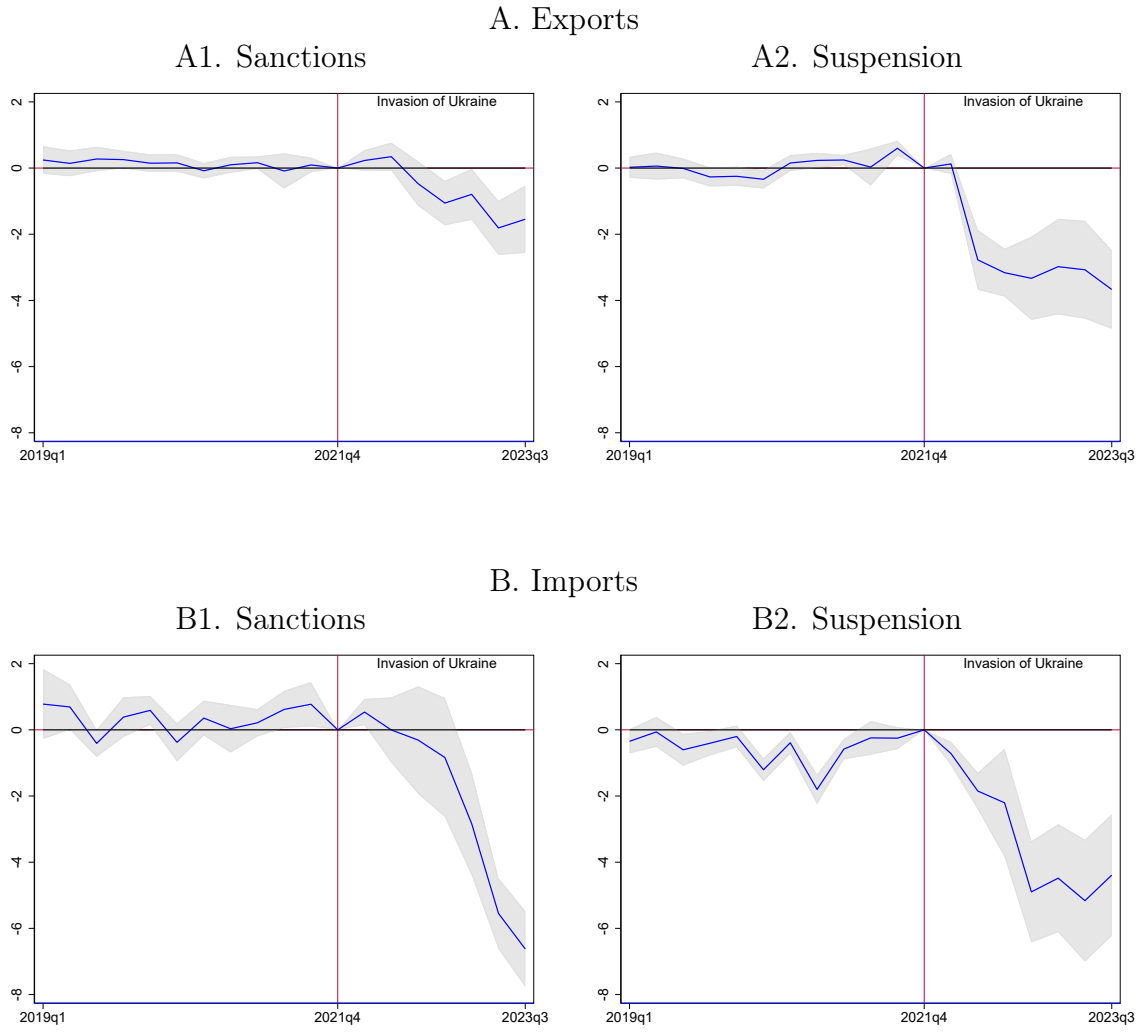
Columns 4 and 5 present the impact of sanctions and suspension on imported quantities and prices. There was a significant decrease in import quantities for firms that suspended activities in Russia. However, the export ban to the EU imposed by Russia had no significant effect on imported quantities. There was a significant decrease in the quantity of coal, crude oil, goods that generate significant revenue for Russia, and steel imported by Spain from Russia. Sanctions had no impact on the quantity of jewelry imported from Russia after the invasion of Ukraine. There was a significant increase in the import price of products affected by the export ban, and also in the import price of coal and steel. Instead, sanctions had a negative effect on the price of crude oil. In any case, these estimates should be taken with great care as a result of the thinness of the sample.

Panel A of Figure 2 shows the evolution of the quarterly sanction and suspension coefficients estimated with Equation (2) for Spanish exports to Russia. In addition to the point estimate, we draw the 90% confidence interval for each coefficient. The reference quarter is 2021q4. Panel B shows the quarterly coefficients for Spanish imports from Russia. We do not observe any pretrend in the pre-invasion quarterly coefficients in any panel. The absence of pretrends validates the difference-in-differences identification strategy followed in our study. In line with the estimates reported in column 2 of Tables 1 and 3, in all panels, the quarterly coefficients become negative after the invasion of Ukraine. Furthermore, the quarterly coefficients become more negative as we progress in the post-invasion period. Regarding sanctions, this downward trend is explained by the fact that the EU imposed additional sanction packages as Russia persisted in its invasion of Ukraine (see Table A.1 in the appendix). Regarding suspension, the downward trend is explained by the fact that more firms were able to complete the suspension of activities as the post-invasion period progressed.

Finally, we analyze whether the EU sanctions on Russia and firms' decision to suspend activities in that country had an impact on the Spanish firms' entry or exit from the Russian market. We use an equation similar to (1), where now the dependent variable is an indicator variable that turns one if a firm begins exporting a product to Russia (entry) or if a firm stops exporting to Russia (exit). We define that a firm begins to export to Russia if it does not export product k at time $t-1$ and exports product k at time t. We

[18]The ban on crude oil imports entered into force on December 5, 2022, and the ban on petroleum products on February 5, 2023.

Figure 2: Quarterly coefficients on the impact of sanctions and the suspension of activities in Russia, 2019q1-2023q3



Note: The figures report the point estimate and the 90% confidence interval of the quarter coefficients estimated in Equation (2). The excluded category is 2021q4.

define that a firm stops exporting to Russia if it exports product k at time $t-1$ and does not export product k at time t. The same definitions apply to imports. We estimate a linear probability model.

Column 1 of Table 4 shows that sanctions reduced the probability of beginning to export a product to Russia by 3.2 percentage points after the invasion of Ukraine. The suspension of activities decreased the probability of starting to export by 9.9 percentage points (column 2). Sanctions on industrial goods had a significant negative effect on the probability of entering the Russian market. Sanctions had no significant effects on the probability of starting to export oil refining, aviation, military, maritime, luxury goods and firearms to Russia. Paradoxically, sanctions on dual-use goods increased the probability of entering the Russian market after the invasion of Ukraine.

Table 4: Extensive margin - Exports

	Entry			Exit		
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{Sanction}_k \times \text{Post}_t^i$	-0.032^a	-0.034^a		0.171^a	0.174^a	
	(0.006)	(0.006)		(0.023)	(0.024)	
$\text{Suspension}_f \times \text{Post}_t$		-0.099^a	-0.101^a		0.249^a	0.256^a
		(0.008)	(0.008)		(0.017)	(0.016)
$\text{Dual use}_k \times \text{Post}_t^i$			0.194^a			-0.153^c
			(0.030)			(0.085)
$\text{Oil refining}_k \times \text{Post}_t^i$			0.008			0.116^c
			(0.012)			(0.062)
$\text{Aviation}_k \times \text{Post}_t^i$			0.003			0.337^a
			(0.029)			(0.027)
$\text{Military}_k \times \text{Post}_t^i$			-0.005			0.299^a
			(0.009)			(0.046)
$\text{Maritime}_k \times \text{Post}_t^i$			0.038			0.041^a
			(0.035)			(0.012)
$\text{Luxury}_k \times \text{Post}_t^i$			-0.017			-0.013
			(0.012)			(0.039)
$\text{Industrial}_k \times \text{Post}_t^i$			-0.050^a			0.259^a
			(0.006)			(0.019)
$\text{Firearsm}_k \times \text{Post}_t^i$			-0.066			0.000
			(0.041)			(.)
Observations	160642	160642	160642	41877	41877	41877
Adjusted-R2	0.075	0.078	0.079	0.315	0.321	0.322

Note: In columns 1 to 3 the dependent variable turns one if firm f did not export product k at time $t-1$ and exported product k at time t. In columns 4 to 6 the dependent variable turns one if firm exported product k at time $t-1$ and did not export product k at time t. All estimations include a firm×product, a time fixed effect, and a constant. Standard errors clustered at the product level are in parentheses. a, b, and c: statistically significant at 1%, 5%, and 10%, respectively.

Columns 4 to 6 report the estimates for exit. Sanctions increased the probability of stopping exporting to Russia by 17 percentage points (column 4), while suspension of activities increased the probability of exiting by 25 percentage points (column 5). Sanctions significantly increased the probability of exit in oil refining, aviation, military, maritime, and industrial goods.

Table 5 presents the import estimates. Sanctions reduced the probability of starting to import from Russia by 4.2 percentage points (column 1). Russia's export bans and firms' decision to suspend activities had no significant effect on the probability that a Spanish firm began importing a product from Russia (column 2). Sanctions had a signifi-

Table 5: Extensive margin - Imports

	Entry			Exit		
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{Sanction}_k \times \text{Post}_t$	-0.042^a	-0.042^a		0.215^a	0.218^a	
	(0.009)	(0.009)		(0.045)	(0.045)	
$\text{Russia's export ban}_k \times \text{Post}_t$	-0.001	0.001	0.001	0.168	0.165	0.165
	(0.022)	(0.022)	(0.022)	(0.121)	(0.123)	(0.122)
$\text{Suspension}_f \times \text{Post}_t$		-0.017	-0.014		0.096^b	0.096^b
		(0.017)	(0.017)		(0.047)	(0.047)
$\text{Coal}_k \times \text{Post}_t^i$			-0.121^a			0.006
			(0.043)			(0.056)
$\text{Crude oil}_k \times \text{Post}_t^i$			-0.098^a			0.340^a
			(0.030)			(0.060)
$\text{Jewelry}_k \times \text{Post}_t^i$			0.135^a			0.000
			(0.007)			(.)
$\text{Revenue}_k \times \text{Post}_t^i$			-0.037^a			0.225^a
			(0.010)			(0.046)
$\text{Steel}_k \times \text{Post}_t^i$			-0.048^a			0.557^a
			(0.014)			(0.146)
Observations	30088	30088	30088	5244	5244	5244
Adjusted-R2	0.042	0.042	0.043	0.260	0.261	0.261

Note: In columns 1 to 3 the dependent variable turns one if firm f did not import product k at time $t-1$ and imported product k at time t. In columns 4 to 6 the dependent variable turns one if firm imported product k at time $t-1$ and did not import product k at time t. All estimations include a firm×product, a time fixed effect, and a constant. Standard errors clustered at the product level are in parentheses. a, b, and c: statistically significant at 1%, 5%, and 10%, respectively.

cant negative effect on entry in all affected products. Sanctions increased the probability of stopping importing a product from Russia by 21.5 percentage points (column 4). The suspension of activities in Russia increased the probability of stopping importing a product by 9.6 percentage points, while export bans had no effect on the probability of exiting. Sanctions increased the probability of stopping imports of crude oil, products which generate significant revenues for Russia, and steel. However, sanctions had no effect on the probability of stopping the import of coal.

3.3 Robustness

This subsection tests the robustness of our estimates. First, the baseline estimation assumes that sanctions fully account for the difference in the evolution of Spanish trade with Russia between sanctioned and unsanctioned products after the invasion of Ukraine.

Similarly, the estimation assumes that the suspension coefficient fully accounts for the difference in trade between firms that suspended activities in Russia and firms that stayed in Russia after the invasion of Ukraine. However, if the invasion of Ukraine coincided with a global decrease in demand for sanctioned products or with a worse performance from firms that decided to suspend activities in Russia, the sanction and suspension coefficients would also capture these effects. To rule out this possibility, we enlarge our sample with a control set of countries and estimate a triple-difference regression:

$$y_{fkdt} = exp(\sum_i \alpha_i(Sanction_k^i \times Post_t^i \times Russia_d) + \beta(Suspension_f \times Post_t^f \times Russia_d) + \gamma_{fkt} + \gamma_{kd} + \gamma_{dt}) * \epsilon_{fkdt} \quad (3)$$

Now, the dependent variable, y_{fkdt}, is the value of the exports of product k from firm f to destination d at time t. The interaction terms include a new indicator variable, $Russia_d$, which takes the value of one if exports are destined to Russia. The new equation includes more granular fixed effects. γ_{fkt} is a firm-product-time fixed effect. It controls all variables that affect the supply or demand for product k by firm f at time t, such as marginal costs or production capacity at a specific time. γ_{kd} is a product-destination fixed effect. It captures the time-invariant factors that determine the demand for product k at destination d. γ_{dt} is a destination-time fixed effect. It controls for all time-variant factors, such as GDP, that affect trade flows with d. ϵ_{fkdt} is the disturbance term. A similar interpretation applies to imports.

The sanction coefficient now captures a triple difference. The first difference compares a firm's exports of a sanctioned product and an unsanctioned product to Russia. The second compares the same firm's exports of a sanctioned product and an unsanctioned product to a control country. The third compares the difference between the previous two comparisons before and after the invasion of Ukraine. The suspension coefficient is also the result of a triple difference. The first compares product k exports to Russia from a firm that decided to suspend activities in Russia and product k exports from a firm that decided to stay in Russia. The second compares the value of exports for the same firms and product, but at a control destination. The third compares the difference between the previous two comparisons before and after the invasion of Ukraine. The same interpretation applies to imports. Note that this estimation is more demanding than the baseline estimation, since it requires a firm to export the same product(s) to more than one destination.

Since a very large number of zero-valued observations compromises our computational capacity, we collapse Spanish firms' trade with all non-Russian countries into a rest-of-

Table 6: Robustness. Impact of reputation and sanctions on Spanish firms' trade with Russia and the rest of the world

	Exports			Imports		
	(1) Value	(2) Entry	(3) Exit	(4) Value	(5) Entry	(6) Exit
$\text{Sanction}_k \times \text{Post}_t^i \times \text{Russia}_d$	-1.011^a	-0.022^a	0.154^a	-3.106^a	-0.024^a	0.176^a
	(0.158)	(0.002)	(0.025)	(0.633)	(0.002)	(0.061)
$\text{Russia's export ban}_k \times \text{Post}_t \times \text{Russia}_d$				-2.296^a	-0.015^a	0.119
				(0.553)	(0.004)	(0.120)
$\text{Suspension}_f \times \text{Post}_t \times \text{Russia}_d$	-1.331^a	-0.004^b	0.122^a	-0.801^c	-0.005^a	0.130^b
	(0.166)	(0.002)	(0.018)	(0.456)	(0.002)	(0.053)
Observations	995954	2813248	79874	322190	1955072	6476
Pseudo-R2	0.993			0.989		
Adjusted R2		0.073	0.338		0.078	0.224

Note: In column 1 and 4 the dependent variable is the value of exports and imports, respectively. In column 2 (5) the dependent variable turns one if firm f did not export (import) product k at time $t-1$ and exported (imported) product k at time t. In column 3 (6) the dependent variable turns one if firm exported (imported) product k at time $t-1$ and did not export (import) product k at time t. All estimations include a firm×product×time fixed effect, a destination×time fixed effect, and a constant. Standard errors clustered at the product-time level are in parentheses. a, b, and c: statistically significant at 1%, 5%, and 10%, respectively.

the-world partner. Table 6 presents the results. Sanctions and suspension have a strong negative impact on exports to Russia after the invasion of Ukraine. There is also a reduction in export entry and an increase in export exit after the invasion of Ukraine. Compared to the benchmark estimates (Table 1, the difference between the sanction and suspension coefficients is smaller. Sanctions, Russia's export bans, and suspension have a strong negative impact on Spanish imports from Russia. The point values of the sanction and the Russian export ban coefficients are higher (in absolute terms) than those reported in the benchmark regression (column 2 of Table 3), but lower for suspension. Sanctions and suspension reduce import entry and increase import exit from Russia after the invasion of Ukraine. In summary, the results are qualitatively similar to those reported in the benchmark analysis.

Second, in the baseline estimations, we assumed that all firms that suspended activities in Russia began to take actions to terminate their activities since the invasion of Ukraine occurred. However, some firms that finally suspended their activities in Russia might have followed a wait-and-see strategy during the first quarters after the invasion of Ukraine. To address this possibility, we assume that firms began the process of suspending activities on the date on which they issued a statement regarding the termination of activities in Russia. We obtain this date from the Russia-Leave list. Therefore, in the robustness estimation, the $Post_t$ variable that multiplies the suspension variable becomes

Table 7: Robustness. Firm-specific suspension date

	Exports			Imports		
	(1) Value	(2) Entry	(3) Exit	(4) Value	(5) Entry	(6) Exit
$\text{Sanction}_k \times \text{Post}_t$	-0.785^a	-0.036^a	0.191^a	-1.606^a	-0.042^a	0.218^a
	(0.283)	(0.006)	(0.025)	(0.567)	(0.009)	(0.044)
Russia's export $\text{ban}_k \times \text{Post}_t$				-1.864^a	0.001	0.145
				(0.598)	(0.022)	(0.127)
$\text{Suspension}_f \times \text{Post}_t^f$	-3.162^a	-0.109^a	0.435^a	-3.201^a	-0.018	0.214^a
	(0.521)	(0.007)	(0.021)	(0.571)	(0.016)	(0.061)
Observations	218861	160642	41877	38380	30088	5244
Pseudo-R2	0.746			0.865		
Adjusted R2		0.078	0.324		0.042	0.263

Note: In column 1 and 4 the dependent variable is the value of exports and imports, respectively. In column 2 (5) the dependent variable turns one if firm f did not export (import) product k at time $t-1$ and exported (imported) product k at time t. In column 3 (6) the dependent variable turns one if firm exported (imported) product k at time $t-1$ and did not export (import) product k at time t. All estimations include a firm×product×time fixed effect, a destination×time fixed effect, and a constant. Standard errors clustered at the product-time level are in parentheses. a, b, and c: statistically significant at 1%, 5%, and 10%, respectively.

a firm-specific $Post_t^f$ variable. Table 7 presents the results. There is a large increase in the (absolute) point value of the suspension coefficient for value and exit. These results suggest that firms materialize the reduction of trade activities in Russia in the year-quarter in which they announce the suspension of activities. The remaining estimates are qualitatively similar to those reported in the baseline analysis.

4 Did firms reroute trade with Russia via neighboring countries?

This section examines the phenomenon of trade rerouting, that is, whether firms used third countries close to Russia to circumvent sanctions or suspension and carry on trading with Russia. Using product-level data, Chupilkin et al. (2023) observed a simultaneous drop in exports of sanctioned products from the EU to Russia, while an increase in exports of sanctioned goods to Armenia, Kazakhstan and the Kyrgyz Republic (CCA3). These three countries are members of the Eurasian Customs Union alongside Belarus and Russia. Therefore, exports and imports from these economies could potentially be shipped from Russia with minimum checks. We investigate whether Spanish firms increased trade flows in sanctioned products, relative to unsanctioned products, with CCA3 after the invasion of Ukraine. We also explore whether firms that suspended activities in Russia increased trade flows with CCA3, relative to firms that did not suspend activities in Russia, after the invasion of Ukraine.

Table 8: Rerouting trade with Russia

Panel A (CCA3: Armenia, Kazakhstan and the Kyrgyz Republic)

	Exports			Imports		
	(1) Value	(2) Entry	(3) Exit	(4) Value	(5) Entry	(6) Exit
$\text{Sanction}_k \times \text{Post}_t$	0.552	0.011[b]	-0.028	0.853[a]	0.015	0.026
	(0.417)	(0.006)	(0.028)	(0.291)	(0.013)	(0.022)
Russia's export $\text{ban}_k \times \text{Post}_t$				-1.034	-0.055	-0.004
				(1.006)	(0.039)	(0.019)
$\text{Suspension}_f \times \text{Post}_t^f$	0.649	-0.006	-0.084[a]	-0.852	-0.039[a]	0.011
	(0.409)	(0.006)	(0.021)	(0.719)	(0.013)	(0.021)
Observations	69787	110255	26785	2356	6277	999
Pseudo-R2	0.707			0.939		
Adjusted R2		0.244	0.474		0.433	0.680

Panel B (CCA3+Azerbaijan+Georgia+Turkey)

	Exports			Imports		
	(1) Value	(2) Entry	(3) Exit	(4) Value	(5) Entry	(6) Exit
$\text{Sanction}_k \times \text{Post}_t$	0.110	0.009[c]	-0.010	0.480[a]	0.013	0.048[c]
	(0.133)	(0.005)	(0.025)	(0.101)	(0.008)	(0.025)
Russia's export $\text{ban}_k \times \text{Post}_t$				-0.004	0.028	0.002
				(0.150)	(0.018)	(0.013)
$\text{Suspension}_f \times \text{Post}_t^f$	0.028	0.038[a]	0.020	-0.157	0.001	0.016
	(0.162)	(0.008)	(0.015)	(0.098)	(0.009)	(0.033)
Observations	264271	287583	36835	91409	100421	3438
Pseudo-R2	0.850			0.916		
Adjusted R2		0.382	0.639		0.450	0.709

Note: In column 1 and 4 the dependent variable is the value of exports and imports, respectively. In column 2 (5) the dependent variable turns one if firm f did not export (import) product k at time $t-1$ and exported (imported) product k at time t. In column 3 (6) the dependent variable turns one if firm exported (imported) product k at time $t-1$ and did not export (import) product k at time t. All estimations include a firm×product×time fixed effect, a destination×time fixed effect, and a constant. Standard errors clustered at the product-time level are in parentheses. a, b, and c: statistically significant at 1%, 5%, and 10%, respectively.

We estimate Equation (1), substituting Spanish firms' trade flows with Russia by those with CCA3. It is important to note that the sample only includes Spanish firms that traded with Russia between 2014q1 and 2023q3. Panel A of Table 8 presents the results for CCA3. Columns 1 to 3 show the results for exports and columns 4 to 6 the ones for imports. The sanction and suspension coefficients in column 1 are positive, but statistically insignificant. They indicate that Spanish firms did not significantly increase exports of sanctioned products, relative to unsanctioned ones, to CCA3 after the invasion of Ukraine.

Firms increased their probability of starting exporting to CCA3 in sanctioned products, relative to unsanctioned products, after the invasion of Ukraine. However, this increase in the entry rate was not large enough to cause a significant increase in exports. We observe no difference in the export entry rate for firms that suspended activities in Russia. The probability of stopping exporting to CCA3 decreased for firms that suspended activities in Russia, relative to other firms that did not suspend activities in Russia, after the invasion of Ukraine. However, this reduction in exit rate did not lead to a significant change in the value of trade flows of suspension firms with CCA3.

Imports of sanctioned products from CCA3 increased relative to those not sanctioned after the invasion of Ukraine. However, this increase may be explained by the higher price of energy products, which represented 93% of the total Spanish imports from CCA3 during the post-invasion period. We do not observe significant changes in the value of imports for products affected by Russian export bans or for suspension firms. Firms that suspended activities in Russia reduce the probability of starting to import products from CCA3. There are no significant changes in the entry rate for sanctioned and export-ban products. We also did not observe significant changes for exit rates. In summary, our results do not support the hypothesis that Spanish firms rerouted their trade with Russia through CCA3 to circumvent sanctions and suspension decisions after the invasion of Ukraine.

As a robustness check, panel B of Table 8 expands the number of potential trade intermediaries with Azerbaijan and Georgia, two former Soviet republics, not members of the EU, that share a land border with Russia; and Turkey, a neighboring country which has not imposed sanctions on Russia and has preferential access to the EU market. There is no increase in exports to potential intermediaries of sanctioned products or exports by firms that suspended activities in Russia after the invasion of Ukraine. There is an increase in the probability that firms begin exporting sanctioned products to intermediaries after the invasion of Ukraine. We find a similar effect for firms that suspended activities in Russia. However, the increase in entry is not large enough to generate an increase in exports to intermediaries. There are no significant changes in the probability of stopping exporting sanctioned products or products from suspension firms to intermediaries. As before, after the invasion of Ukraine, there is an increase in imports of sanctioned products. We find no impact on suspension firms' imports. We do not observe any signs of rerouting at import entry or exit. In summary, in the enlarged sample, the evidence also does not support the hypothesis that firms maintained their trade relationship with Russia through intermediaries.

5 Conclusion

In the last two decades, there has been an increase in the use of trade sanctions to punish partner misbehavior. In the same period, due to the expansion of social networks, multinational companies have become more exposed to a rapid and global spread of any criticism for their actions. The Russian invasion of Ukraine in February 2022 is an example in which these trends meet. By November 2023, the EU had already imposed eleven rounds of sanctions against Russia, which affected a large number of exported and imported products. Furthermore, many multinational firms, fearing that maintaining their activities in Russia could affect their reputation in the EU, the United States, and other developed countries, decided to voluntary suspend activities in Russia after the invasion of Ukraine.

The goal of this paper has been to estimate the impact of EU trade sanctions and firms' decision to suspend activities in Russia on trade flows. Using a representative sample of Spanish firms, we find that sanctions have had a strong negative effect on trade with Russia. Exports and imports of sanctioned products decreased by 53% and 84%, respectively, compared to unsanctioned products after the invasion of Ukraine. Therefore, unlike previous episodes, sanctions have been a powerful tool in reducing trade with Russia. The paper also shows that firms that suspended activities in Russia, after controlling for the effect of sanctions, reduced their exports and imports from Russia by 77% and 79%, respectively, relative to firms that stayed in Russia after the invasion of Ukraine. We do not find evidence supporting the hypothesis that Spanish firms rerouted their trade with Russia through neighboring countries to circumvent sanctions and suspension decisions after the invasion of Ukraine.

Since the firms that decided to suspend their activities in Russia represented a large share of total exports and imports, their decision had a large impact on aggregate trade flows. Specifically, the decision of firms to suspend activities in Russia contributed to the reduction in exports and imports by 26% and 43%, respectively, while sanctions contributed by 9% and 21%, respectively. These figures highlight that firms' actions to safeguard their reputation can significantly complement sanctions in reducing the amount of trade with target countries.

References

Balyuk, T. and Fedyk, A. (2023). Divesting under pressure: U.S. firms' exit in response to Russia's war against Ukraine. *Journal of Comparative Economics*, In press.

Bowen, H. R. (2013). *Social responsibilities of the businessman.* University of Iowa Press.

Chupilkin, M., Javorcik, B., and Plekhanov, A. (2023). The Eurasian Roundabout: Trade Flows Into Russia Through the Caucasus and Central Asia. *EBRD Working Paper No. 276*.

Correia, S., Guimarães, P., and Zylkin, T. (2020). Fast Poisson estimation with high-dimensional fixed effects. *The Stata Journal*, 20(1):95–115.

Crozet, M. and Hinz, J. (2020). Friendly fire: the trade impact of the Russia sanctions and counter-sanctions. *Economic Policy*, 35(101):97–146.

Crozet, M., Hinz, J., Stammann, A., and Wanner, J. (2021). Worth the pain? Firms' exporting behaviour to countries under sanctions. *European Economic Review*, 134:103683.

de Lucio, J., Mínguez, R., Minondo, A., and Requena, F. (2018). The variation of export prices across and within firms. *Review of World Economics*, 154(2):327–346.

Felbermayr, G., Morgan, T. C., Syropoulos, C., and Yotov, Y. V. (2021). Understanding economic sanctions: Interdisciplinary perspectives on theory and evidence. *European Economic Review*, 135:103720.

Gullstrand, J. (2020). What goes around comes around: The effects of sanctions on Swedish firms in the wake of the Ukraine crisis. *The World Economy*, 43(9):2315–2342.

Helpman, E., Melitz, M. J., and Yeaple, S. R. (2004). Export versus fdi with heterogeneous firms. *American Economic Review*, 94(1):300–316.

Koenig, P. and Poncet, S. (2022). The effects of the Rana Plaza collapse on the sourcing choices of French importers. *Journal of International Economics*, 137:103576.

Kohl, T., van den Berg, M., and Franssen, L. (2023). Going Dutch? Firm exports and FDI in the wake of the 2014 EU-Russia sanctions. *Review of International Economics*, In press.

Meyer, K. E., Fang, T., Panibratov, A. Y., Peng, M. W., and Gaur, A. (2023). International business under sanctions. *Journal of World Business*, 58(2):101426.

Morgan, T. C., Syropoulos, C., and Yotov, Y. V. (2023). Economic sanctions: Evolution, consequences, and challenges. *Journal of Economic Perspectives*, 37(1):3–29.

Mylovanov, T., Shapoval, N., Onopriienko, A., and Hrybanovskyi, O. (2023). How to Identify Foreign Business in Russia and What are the Key Issues of Creating and Keeping a Full List of the Largest Foreign Companies in Russia. *SSRN Working Paper 4407284*, Available at https://ssrn.com/abstract=4407284.

Santos-Silva, J. and Tenreyro, S. (2010). Further simulation evidence on the performance of the Poisson pseudo-maximum likelihood estimator. *Economics Letters*, 112(2):220 – 222.

Sonnenfeld, J., Tian, S., Zaslavsky, S., Bhansali, Y., and Vakil, R. (2022). It pays for companies to leave Russia. *SSRN Working Paper 4112885*, Available at https://ssrn.com/abstract=4112885.

Syropoulos, C., Felbermayr, G., Kirilakha, A., Yalcin, E., and Yotov, Y. V. (2023). The global sanctions data base–Release 3: COVID-19, Russia, and multilateral sanctions. *Review of International Economics*, In press.

Table A.1: Timeline of European Union's trade sanctions against Russia after the invasion of Ukraine

Date	Products affected
25 Feb, 2022	(i) Export ban on specific goods and technologies in oil refining; (ii) export ban on goods and technology suitable for use in the aviation or space industry; (iii) export ban on goods and technology which could contribute to Russia's military and technological enhancement or the development of the defense and security sector; (iv) dual-use goods and technology.
9 Mar, 2022	Export ban on maritime navigation goods and technology.
15 Mar, 2022	(i) Export ban on luxury goods; (ii) import restrictions on iron and steel goods.
8 April, 2022	(i) Export ban on jet fuel and fuel additives; (ii) export ban on goods which could contribute to the enhancement of Russian industrial capacities; (iii) import ban on coal and other solid fossil fuels from August 2022 onward; (iv) import ban on goods which generate significant revenues for Russia.
3 Jun, 2022	(i)Import ban of crude oil and petroleum products, with limited exceptions (phase out will take 6 months for crude oil to 8 months for other refined petroleum products); (ii) New products included in the import ban on goods which generate significant revenues for Russia.
21 Jul, 2022	Ban on imports of gold and jewelry.
6 Oct, 2022	(i) New products included in the export ban on goods and technology that could contribute to the military and technological enhancement; (ii) New products included in the export ban on goods and technology suitable for use in the aviation or space industry; (iii) import ban on steel products; (iv) New products included in the import ban on goods which generate significant revenues for Russia.
16 Dec, 2022	(i) New products included in the export ban on goods and technology which could contribute to military and technological enhancement; (ii) New products included in the export ban on goods and technology suitable for use in the aviation or space industry; (iii) New products included in the export ban on goods which could contribute to the enhancement of Russian industrial capacities; (iv) New products included in the import ban on steel products.
25 Feb, 2023	(i) New products included in the export ban on goods and technology which could contribute to the military and technological enhancement; (ii) New products included in the export ban on goods and technology suitable for use in the aviation or space industry; (iii) New products included in the export ban on goods which could contribute to the enhancement of Russian industrial capacities; (iv) New products included in the import ban on goods which generate significant revenues for Russia.
23 Jun, 2023	(i) New products included in the export ban on goods and technology which could contribute to the military and technological enhancement; (ii) export ban on firearms and their parts; (iii) New products included in the export ban on luxury goods; (iv) New products included in the export ban on goods which could contribute to the enhancement of Russian industrial capacities.

Source: authors' own elaboration.

Table A.2: Suspension firms vs. non-suspension firms, 2019-2021 (annual averages)

	Exports		Imports	
Variable	Suspension	Non-suspension	Suspension	Non-suspension
Number of traders	46	2,683	46	934
With all countries				
Exports (thousand euros)	510,434	9,427	549,884	10,245
Number of products	35	7	47	10
Number of countries	17	6	9	4
With Russia				
Exports (thousand euros)	10,864	689	66,089	3,395
Number of products	16	2	2	1

Note: Average annual values for the period 2019-2021. Suspension firms are those Spanish firms headquartered in Spain or foreign firms that have subsidiaries in Spain that have an exit or leave status in the Yale CELI and Leave-Russia lists. 28 firms exported and imported from Russia, 18 only exported to Russia, and 18 only imported from Russia. Source: authors' own elaboration using data from AEAT-Customs.