

Juust, Mathias; Varblane, Urmas

## Book

# Firm-level capabilities and response to a negative export shock : 2014 Russian embargo on the West

## Provided in Cooperation with:

University of Tartu

*Reference:* Juust, Mathias/Varblane, Urmas (2024). Firm-level capabilities and response to a negative export shock : 2014 Russian embargo on the West. Tartu : The University of Tartu FEBA.  
<https://mjtoimetised.ut.ee/febpdf/febawb145.pdf>.

This Version is available at:

<http://hdl.handle.net/11159/653688>

## Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics  
Düsternbrooker Weg 120  
24105 Kiel (Germany)  
E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)  
<https://www.zbw.eu/>

## Standard-Nutzungsbedingungen:

Dieses Dokument darf zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden. Sie dürfen dieses Dokument nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, aufführen, vertreiben oder anderweitig nutzen. Sofern für das Dokument eine Open-Content-Lizenz verwendet wurde, so gelten abweichend von diesen Nutzungsbedingungen die in der Lizenz gewährten Nutzungsrechte. Alle auf diesem Vorblatt angegebenen Informationen einschließlich der Rechteinformationen (z.B. Nennung einer Creative Commons Lizenz) wurden automatisch generiert und müssen durch Nutzer:innen vor einer Nachnutzung sorgfältig überprüft werden. Die Lizenzangaben stammen aus Publikationsmetadaten und können Fehler oder Ungenauigkeiten enthalten.

<https://savearchive.zbw.eu/termsfuse>

## Terms of use:

*This document may be saved and copied for your personal and scholarly purposes. You are not to copy it for public or commercial purposes, to exhibit the document in public, to perform, distribute or otherwise use the document in public. If the document is made available under a Creative Commons Licence you may exercise further usage rights as specified in the licence. All information provided on this publication cover sheet, including copyright details (e.g. indication of a Creative Commons license), was automatically generated and must be carefully reviewed by users prior to reuse. The license information is derived from publication metadata and may contain errors or inaccuracies.*

**University of Tartu**

School of Economics and Business Administration

**FIRM-LEVEL CAPABILITIES AND  
RESPONSE TO A NEGATIVE EXPORT  
SHOCK: 2014 RUSSIAN EMBARGO ON  
THE WEST**

Mathias Juust, Urmas Varblane

**Tartu 2024**

ISSN-L 1406-5967  
ISSN 1736-8995  
ISBN 978-9985-4-1414-9 (pdf)  
The University of Tartu FEBA  
<https://majandus.ut.ee/en/research/workingpapers>

## **Firm-level capabilities and response to a negative export shock: 2014 Russian embargo on the West**

Mathias Juust, Urmas Varblane<sup>1</sup>

### **Abstract**

This paper investigates the resources and capabilities that determine firm-level adjustments after a sudden unexpected closure of a major export market. We focus on the effects of the 2014 Russian embargo on Western food exporters using the example of Estonian firms. The paper applies a novel multimethod approach consisting of Study I quantifying the embargo effect on the exports of all embargoed firms, and Study II conducting a multiple case study into three dairy exporters highly affected by the embargo. Study I employs a difference-in-difference model with matched embargoed firms as treatment. Study II builds on extensive document analysis that serves as input for interviews with the CEOs of the sample dairy firms. We find that pre-shock productivity is on average a good predictor of post-shock firm resilience (Study I), however, we specify that the key firm-level resources and capabilities necessary for successful post-shock adjustments might not be reflected in the standard quantitative productivity level measures (Study II). We conclude that key firm-level resources and capabilities for embargo-resilience are the quality of exporting experience, competitive product-market matching, absorptive capacity, and managerial vision and empowerment.

**Keywords:** negative export shock, embargo, firm-level capabilities, trade barriers, trade diversion, trade policy

**JEL Classification:** F13, F14

---

<sup>1</sup>Mathias Juust (corresponding author), PhD Student, University of Tartu, School of Economics and Business Administration, Narva Rd. 18, Tartu, 51009, Estonia. E-mail: [mathias.juust@ut.ee](mailto:mathias.juust@ut.ee);  
Urmas Varblane, Professor, School of Economics and Business Administration, University of Tartu, Estonia. E-mail: [urmas.varblane@ut.ee](mailto:urmas.varblane@ut.ee).

# 1 Introduction

The unexpected closure of a major export market can have a negative effect on firm-level exports and lead to trade diversion to other markets (Cheptea and Gaigné 2020; Kutlina-Dimitrova's 2017; Sagi and Nikulin 2017; Lastauskas et al. 2023). Higher productivity has been shown to be a proxy of firm resilience in response to negative demand shocks (Lewrick et al. 2018; Foster et al. 2016) or increased competition as such (Bernard et al. 2003; Melitz and Trefler 2012), however, productivity is essentially a synthetic quantitative measure of the level of different resources and capabilities that firms are able to apply in response to exogenous shocks. While higher productivity could be a good predictor of post-shock firm-level success, it is not clear which firm-level capabilities as building blocks of the productivity statistic actually matter after a major trade shock like an embargo.

This paper addresses the question which are the key firm-level resources and capabilities, embedded in the firm's productivity level indicator, for adjusting to a negative trade shock. For this, we study the effects of the 2014 Russian embargo on Western food products (meat, fish, dairy, vegetables) using the example of Estonian food exporters that were highly dependent on the large neighbouring Russian market. In Study I, we quantify the effect of the embargo on the exports and productivity of all affected exporters. In Study II, we conduct an in-depth investigation of three firms highly affected by the embargo to find out which resources or capabilities were crucial for successful firm-level adjustments to the embargo.

The empirical analysis uses a mixed method approach to draw connections between the general embargo effects and firm-level productivity, as well as firm-level resources or capabilities and the post-embargo adjustments. Study I quantifies the general effects of the embargo on firm-level export value and productivity using 2010-2018 data on all Estonian firms that had exported to Russia a year before the embargo. We apply a difference-in-difference model where firms that had exported embargoed products to Russia in 2013 are the treatment group and other exporters to Russia are the control group. The two groups are matched by key firm-level characteristics using CEM (coarsened exact matching). Study II applies the multiple case study framework by zooming in on three Estonian dairy industries for whom Russia was the most important export market. The dairy industry also had the highest value of exports to Russia among the sanctioned food industries in Estonia. This approach enables us to compare the role of the firms' pre-shock resources and capabilities in their post-shock adjustment process. The empirical analysis of Study II relies on extensive document analysis, including firms' yearly fiscal reports, media articles and industry reports, that serve as inputs to CEO interviews.

This paper contributes to the literature of international trade on the effects of negative trade shocks by combining panel data and multiple case study approaches to specify the role of firm-level resources and capabilities in post-shock adjustments. This enables us to draw novel connections between the two branches of literatures that essentially touch upon similar topics on firm-level adjustments during unexpected economic shocks, but often use different concepts for explaining the processes. Our study expands on the existing firm-level analysis on the effects of the 2014 Russian embargo (Kutlina-Dimitrova's 2017; Sagi and Nikulin 2017; Cheptea and Gaigné 2020; Lastauskas et al. 2023) both quantitatively (controlling for key firm-level characteristics like productivity) and qualitatively (using information on directly immeasurable firm-level capabilities).

More broadly, this study relates to the literature on firm-level adaptation to exogenous shocks, for

example through product or destination switching (e.g. Bernard et al. 2010; Iacovone and Javorcik 2010; Mayer et al. 2014) by incorporating aspects of the management literature's concepts on firm-level resources and capabilities (e.g. Kim 1980, Teece et al. 1997; Eisenhardt and Martin 2000; Barney 2001). To our knowledge this is the first study comprehensively examining the firm-level adjustments to negative trade shocks by combining firm-level quantitative panel data with the multiple case study approach.

The study also provides important policy lessons for building firm resilience. The case in hand is ever more relevant after Russia's new unjustified full-scale aggression against Ukraine in 2022, which has resulted in a new intensification of political tensions and rounds of economic sanctions. In a broader perspective and in light of the potential increase of geopolitical tensions around the instrumentalization of trade policy as a foreign policy tool could become even more important. This means that states should be better equipped to build the resilience of their firms to unexpected shocks. The case of Estonian dairy industry is of special interest since it had the highest export level among embargoed food industries (fish, meat, vegetables, dairy), and the Russia represented a key export market for the sample firms in Study II. The findings in Study II could be especially relevant for firms operating in industries with significant non-tariff barriers like phytosanitary rules.

The results of Study I show that embargoed Estonian firms diverted their exports from Russia to other markets more extensively than other Estonian firms that had exported to Russia before the shock, while embargoed firms with higher initial productivity were relatively more effective in trade diversion. Study II on three dairy exporters indicate that the two firms with successful post-embargo adjustments possessed a more diverse set of firm-specific resources and capabilities than the one unsuccessful firm. We identify four such key capabilities: the quality of exporting experience, competitive product-market matching, absorptive capacity, and managerial vision and empowerment.

The rest of the paper proceeds as follows. Section 2 provides an overview of relevant prior literature that provides a theoretical context for the empirical part of this paper. Section 3 further explains the methodology of the empirical study, including the key relationship between Study I and Study II. Section 4 presents the main empirical results, which are further discussed and contextualized in Section 5. Section 6 concludes.

## **2. Literature Review**

This section reviews the results of relevant studies on the effects of negative export shocks and the potential impact channels of export shocks on firm performance. Former literature also provides a theoretical background about the firm-level adjustments to a negative demand shock and the firm-level resources and capabilities that enable these responses.

Several studies have examined the short-term macro-level effects of the Russian embargo on Western countries. Cheptea and Gagné (2020) find that the EU's exports of embargoed goods to Russia fell by 80% in the short run, but also that the EU's total exports of these products increased thanks to trade diversion to other markets. Kutlina-Dimitrova's (2017) CGE (computable general equilibrium) approach estimates that the relative fall in banned EU exports to third markets in the short term was largest in vegetables and fruit (-29%), other meat (-14%), and dairy products (-11%), also indicating substantial trade diversion from Russia to other markets. Lastauskas et al. (2023) find signs of firm-level trade diversion in parallel to a drop in employment and investments. However, Sagi and Nikulin (2017) show that the total exports of embargoed products from Hungary, a small Central-Eastern EU member state, fell significantly

and that trade divergence away from Russia remained limited. Crozet and Hinz (2020) estimate that the 2014 Russian shock resulted in the decline of both Western embargoed and non-embargoed exports.

In the broader literature on economic sanctions and their firm-level effects, Crozet et al. (2021) provide some proof that firms that export to several neighbouring countries might quit exporting to a sanctioned country and keep on exporting indirectly through its other neighbours; they also find sanctions have a more adverse effect on firms relatively more dependent on trade finance instruments. Sun et al. (2021) posit that sanctions increase the market share and performance of non-sanctioned firms compared to sanctioned firms.

International trade and increased market size can induce aggregate welfare gains by benefitting the performance of more productive firms compared to less productive ones (Melitz 2003; Bernard et al. 2003; Melitz & Ottaviano 2008; Melitz and Trefler 2012). Trade liberalization has been shown to reallocate resources from less productive to more productive plants (Pavcnik 2002) or encourage innovation and application of new technology by new exporters (Lileeva and Trefler 2010). Increased competition effects of trade shocks have also been found to lead to more effective innovation activities for high-productivity firms (Aghion et al. 2005), lower profitability and less investments in innovation by low-productivity firms (Autor et al. 2020), or overall worse performance of low-productivity firms facing direct foreign competition (Aghion et al. 2022).

Insights from empirical studies on the firm-level effects of negative demand shocks relate the majority of productivity growth with intra-industry reallocation, including productivity growth of initially more productive or larger firms (Lewrick et al. 2018; Foster et al. 2016). According to Eppinger et al. 2017, the 2008 economic downturn and the contraction of Spanish firms' export and productivity levels eventually led to a refocus on foreign markets and return to previous export levels by 2011. Temel and Forsman (2022) use case studies from Ireland, Finland and the UK to qualitatively analyze which small firms show better sales performance in recessions, concluding that innovation and manager perception of the recession are generally common features of higher firm performance.

Changing export products or destinations represent two options for adapting to a demand shock on a destination market. Topical literature has highlighted how multi-product exporters react to increased competition by product switching in search of efficiency gains (Bernard et al., 2010) or focusing on the most profitable products (Iacovone and Javorcik 2010; Mayer et al. 2014). The ability to change destination markets can vary between firms though. Manova and Zhang (2012) bring out that high-performance exporters can modify the quality of their inputs and output products according to their destination markets, thereby charging higher prices and receiving higher revenues on distant high-income destinations. Brambilla et al. (2012) provide evidence that exporters to high-income countries possess higher skilled employees than firms exporting to low-income countries or not exporting at all, as wealthier markets require higher quality upgrades and skill-intensive services. Bai et al. (2017) suggest that direct exporters show better performance development than indirect exporters, which could be related to a higher degree of learning by doing as a direct exporter.

Firm-level responses to a demand shock are ultimately limited to available options and can be related to firm characteristics. Research by Kim (1980) shows how firms' technology and innovation adoption rates depend on firm-level capabilities. The following literature has distinguished between firms' ordinary capabilities and dynamic capabilities. Ordinary capabilities represent existing means or ways of fulfilling routine tasks, but they remain

intrinsically unchanged by other factors (Winter 2000, 2003). The dynamic capabilities constitute firm-level abilities, processes or knowledge, which enable adapting to different circumstances and profoundly change the firm's way of doing business to gain competitive advantage (Teece and Pisano 1994; Teece et al. 1997; Eisenhardt and Martin 2000). Lee et al. (2009) investigated the effects of the 1990s Asian economic crisis, concluding that Korean firms with flexible capabilities (e.g. level of R&D) found it easier to adapt to the negative shock and refocus on exports than the firms with locked-in location-bound capabilities (e.g. advertising).

A vast empirical literature has inquired which firm-level capabilities make companies succeed during demand shocks. A literature review from the field of business and management by Conz and Magnani (2020) classifies the characteristics of firm resilience into three temporal categories: proactive attributes (pre-shock capabilities), absorptive and adaptive attributes (capabilities during the shock), reactive attributes (post-shock capabilities), and dynamic attributes (capabilities to react before, during and after). In the approach by Cohen and Levinthal (1990) the term absorptive capacity covers the firms' broader ability to use information to gain a competitive advantage, which is path dependent. Lome et al. (2016) found a positive link between manufacturers' R&D intensity and performance during the financial crisis, concluding that this effect was much higher than during regular periods. Zouaghi et al. (2018) highlight the importance of internal capabilities and human capital in mitigating the adverse effects of a financial crisis on low-tech firms, reiterating using external knowledge assets to benefit innovation and adaptation to adverse effects. Makkonen et al. (2014) divide dynamic capabilities into regenerative capabilities (reconfiguration, leveraging, learning) and renewing capabilities (sensing and seizing, knowledge creation, knowledge integration) while using the impact of the global financial crisis on the food processing sector of Finland as one example industry. The study used qualitative questionnaire data and a food industry case study on a small company. Their findings show that operational capabilities and innovation support firms' ability to succeed in a changing environment, in the case of the individually studied food company, through activities like consumer monitoring and cooperation with universities.

There are also more holistic frameworks for explaining firms' competitive advantages that include the competitive forces approach highlighting the firm's position vis-à-vis its main stakeholders (Porter 1985) and the resource-based view focusing on a firm's possession and efficient use of its resources (Barney 1991, 2001; Lockett et al. 2009). In the latter, resources can include any tangible or intangible firm-level assets or capabilities like physical capital, the ability to benefit from external knowledge and R&D (Cohen and Levinthal 1990; Griffith et al. 2003), organizational routines (Teece et al. 1997), or managerial learning (Yoruk 2019).

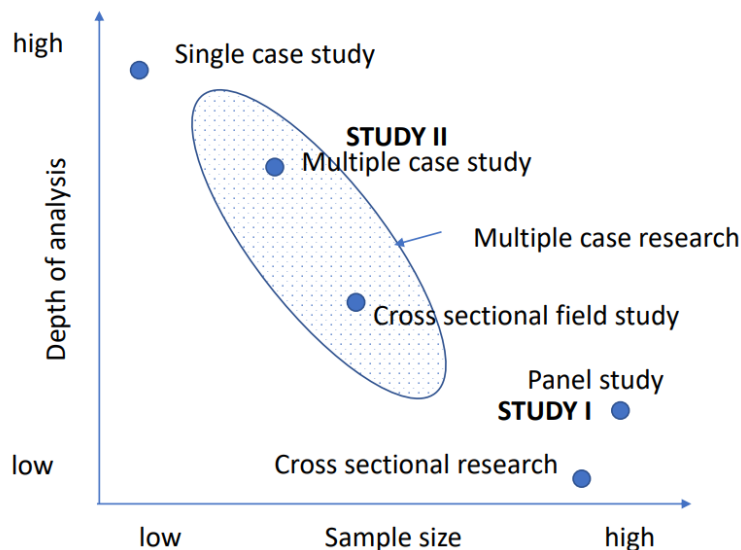
The reviewed literature on the effect of demand shocks on firms predicts that firms with higher initial productivity should be better equipped to adapt after an exogenous shock, which directly relates to this paper's quantitative assessment of the embargo's general effects in Study I. The review also demonstrates the importance of different firm-level resources and capabilities in making firms more resilient to exogenous shocks, the role of which is addressed in our Study II.

### 3. Methodology

The empirical part consists of Study I, a general quantitative assessment of the 2014 Russian embargo effects on all Estonian food exporters affected, and Study II, a multiple case study

focusing on the adjustment of three Estonian dairy exporters to the same shock. As illustrated in figure 1, this mixed method approach allows us to connect general statistical inferences from panel data and a high sample size with in-depth insights from selected sample firms. The purposive sampling of the three companies in Study II was based on the fact that dairy exports constituted a vast majority of embargoed export value from Estonia to Russia (67% in 2013, Josing et al. 2014), and these were the three largest Estonian dairy exporters to Russia prior to the embargo. The multiple case study approach enables us to draw comparisons between the three companies and identify their key resources and capabilities in adjusting to the embargo.

**Figure 1.** Methodology of Study I and II



Source: modified by authors based on Hunziker and Blankenagel (2021, p. 183)

### 3.1. Methodology of Study I: general firm-level embargo effects

Study I provides a quantitative assessment of the Russian embargo's effect on the affected Estonian firms. The assessment applies a difference-in-difference model in combination with the coarsened exact matching method (CEM) to reduce the firm-level differences between the treatment and control groups. The CEM method is used for matching due to its beneficial attributes in reducing the imbalances between the control and treatment groups compared to other common matching methods (Blackwell et al. 2009; Iacus et al. 2012). The treatment group consists of Estonian firms whose value of embargoed products exported to Russia in 2013 constituted at least 5% of their total export value in 2013, a year before the enforcement of the embargo<sup>2</sup>. The control group consists of all other Estonian firms that had exported to Russia in

<sup>2</sup> The full list of embargoed products in meat, fish, vegetables, and dairy can be found on the European Commission (2024) homepage.

2013. The dependent variable is firm-level yearly exports to all destinations and all destinations except for Russia.

The firm-level data used in Study I come from the customs statistics of Statistics Estonia (firm-level yearly exports by destination) and the firm-level performance statistics (employment costs, depreciation and value loss of fixed assets, earnings before taxes, number of employees) from the Estonian Business Register. Our productivity measure is total value added per employee ((employment costs + depreciation and value loss of fixed assets + earnings before taxes)/number of employees). The sample includes firms that had exported to Russia in 2013 and are classified in the European Community (NACE) code of firms under sections A (agriculture, forestry, and fishing), C (manufacturing), and G (wholesale, and retail trade; repair of motor vehicles and motorcycles). The sample excludes firms with less than 5 employees and missing values for employment costs, revenue and number of employees in 2013. Missing values for firms' yearly export values after 2013 were set to zero.

The following firm-level indicators from 2013 are applied in the matching procedure: number of employees, number of export markets, logarithmic value added per employee, logarithmic export value, logarithmic total revenue, ratio of exports to revenue, and share of Russia in total exports. Matching statistics can be found in appendix 1. These indicators cover the pre-shock firm heterogeneities related to the firms' export orientation and dependence on the Russian market, size, and productivity, which represent some key characteristics of firms that could affect their post-shock performance. Sample firms with the top and bottom 1% of export value in 2013 were excluded from the matching procedure.

The applicable empirical model takes the following form:

$$(1) X_{it} = \exp(\beta_0 + \beta_1 Embargo_{it} + \mu_i + \delta_t) \times \varepsilon_{it},$$

where the dependent variable  $X_{it}$  is total exports of firm  $i$  in year  $t$ . The dummy variable  $Embargo_{it}$  takes the value 1 if the value of a firm's embargoed products exported to Russia constituted more than 5% of the same firm's total export value in 2013 and the export flow occurs in 2014-2018. Dummy variables  $\mu_i$  and  $\delta_t$  account for firm and year fixed effects,  $\varepsilon_{it}$  is the error term. The models are estimated with the PPML (Poisson pseudo-maximum likelihood) technique over two different time periods: 2010-2014 and 2010-2018. PPML has several advantages ahead of OLS related to its robustness to heterogeneity and the ability to include zero-value observations (Santos Silva, Tenreiro 2011).

### 3.2. Methodology of Study II: multiple case study on dairy exporters

Study II uses qualitative and quantitative data on three Estonian dairy companies with the highest export levels to Russia before the embargo. The study commenced with an introductory interview with the former head of the Estonian Dairy Association, who held this position in 2007-2020, to gain an initial overview of the sector and the implications of the Russian embargo. The first data sources are the firms' annual reports available in the e-Business Register (2023) that include main business indicators and, in some cases, qualitative self-assessment of performance and/or the business environment. Secondly, we conducted a media search using the names of the given firms as key words in the Dea.digar online database (2023) that contains digitized Estonian newspapers since 1811. The search provided more than 100 relevant articles in 2010-2018, while some articles reported on the same firm-related instances. The relevant information about the sample firms was organised and gradually generalised in order to provide the authors a chronological understanding of the firm-specific sequence of events.

Thirdly, we analyzed documents produced or commissioned by Estonia's Ministry of Agriculture that described the statistics/implications of the 2014 Russian embargo on Estonia (Josing et al. 2014) or provided general overviews of Estonia's dairy industry (Lukk 2016, 2017).

All of the previously collected information was next used as inputs to interviews with the CEOs of the sample firms during the start of the shock to identify the firms' pre-shock resources and capabilities and associate them with their post-shock adjustment process. The interviews followed a semi-structured approach (appendix 2) that mainly inquired about the firms' activities and capabilities before 2014 and firm-level adjustments after the Russian embargo. The insights from the previous extensive document monitoring exercise enabled us to dynamically guide or specify the interview questions related to the firm-level capabilities and adjustments. The interviews confirmed many of our previous observations from other resources, but also presented some completely new information.

## 4. Results

### 4.1 Study I: general embargo effects

Table 1 presents the short-term quantitative effects on the exports of embargoed firms in 2014 and interactions with the pre-shock firm-level share of exports to Russia, productivity, and exports. The treated firms show signs of immediate trade diversion from Russia to other markets compared to control non-embargoed firms, as can be expected (e.g. +76% in column 6, calculated as  $\exp(0.569)-1$ ). Trade diversion is higher among embargoed firms with higher initial exposure to Russia and higher productivity levels. The models on exports to all destinations also show a positive effect on embargoed firms, but interactions with other firm-level characteristics remain statistically insignificant.

**Table 1.** Effects on firm-level exports in the short-term (2014)

	All destinations				All destinations except for Russia			
Embargo	0.442* (0.233)	0.385** (0.195)	-0.051 (3.044)	0.295 (3.134)	0.569** (0.259)	0.136 (0.131)	-3.777** (1.884)	-3.927 (2.86)
Embargo x share of exports to Russia 2013		0.002 (0.006)	0.002 (0.006)	0.002 (0.006)		0.025*** (0.007)	0.024*** (0.007)	0.024*** (0.008)
Embargo x ln(productivity) 2013			0.043 (0.302)	0.051 (0.300)			0.390** (0.184)	0.393* (0.203)
Embargo x ln(export) 2013				-0.021 (0.063)				0.006 (0.052)
Observations	753	753	753	753	734	734	734	734

Notes: All models are estimated using PPML. Models include firm and year dummies. Statistical significance: \* $p < .1$ ; \*\* $p < .05$ ; \*\*\* $p < .01$ . Robust standard errors clustered by firm in parentheses. All models use CEM weights. Yearly data from 2010-2014, treatment starts in 2014 in all models.

In the intermediate term of 2014-2018 (table 2) the positive overall effect on the exports of embargoed firms disappears as compared to short-term effects. However, embargoed firms with higher pre-shock share of exports to Russia and higher productivity levels still show higher export diversion rates. The latter result could indicate substantial differences in the performance of embargoed firms over a longer period with some firms successfully readjusting and others trying to survive. It also has to be considered that the struggling Russian economy after 2014 also had negative implications on the non-embargoed exporters to Russia in the control group that became visible gradually, compared to the immediate effect of the embargo.

**Table 2.** Effects on firm-level exports in the intermediate-term (2014-2018)

	All destinations				All destinations except for Russia			
Embargo	0.333 (0.243)	0.251 (0.176)	-2.102 (3.726)	-2.833 (3.900)	0.498 (0.308)	-0.136 (0.109)	-4.166*** (1.416)	-5.982*** (2.260)
Embargo x share of exports to Russia 2013		0.003 (0.006)	0.003 (0.007)	0.004 (0.007)		0.033*** (0.007)	0.033*** (0.006)	0.035*** (0.007)
Embargo x ln(productivity) 2013			0.234 (0.369)	0.226 (0.362)			0.401*** (0.138)	0.425*** (0.160)
Embargo x ln(export) 2013				0.040 (0.071)				0.078 (0.049)
Observations	1361	1361	1361	1361	1335	1335	1335	1335

Notes: All models are estimated using PPML. Models include firm and year dummies. Statistical significance: \*p<.1; \*\*p<.05; \*\*\*p<.01. Robust standard errors clustered by firm in parentheses. All models use CEM weights. Yearly data from 2010-2018, treatment starts in 2014 in all models.

Table 3 below alternatively presents the effects of the embargo on the same set of firms' productivity measures both in the short- and intermediate terms. The embargo had an immediate negative effect on the firm-level productivity of embargoed firms in 2014. In the intermediate term these effects once again dissolve, although the treatment interaction with the pre-shock export level indicate that larger embargoed firms showed better productivity recovery than smaller exporters. The statistically insignificant differences in 2014-2018 results could again be related to the fact that non-embargoed firms that continued exporting to Russia faced lower demand because of economic difficulties on that market, but it is also possible that the trade firms embargoed by Russia were able to gradually increase their productivity through trade diversion.

**Table 3.** Effects on firm-level productivity in the short-run (2014) and intermediate-term (2014-2018)

	2014				2014-2018			
Embargo	0.046 (0.202)	0.054 (0.295)	-3.257* (1.869)	-4.689** (2.070)	-0.128 (0.135)	-0.245 (0.230)	0.184 (1.209)	-1.978 (1.427)
Embargo x share of exports to Russia 2013		-0.001 (0.005)	0.001 (0.004)	0.001 (0.004)		0.003 (0.003)	0.003 (0.003)	0.003 (0.003)
Embargo x ln(productivity) 2013			0.324* (0.195)	0.148 (0.320)			-0.042 (0.129)	-0.346 (0.243)
Embargo x ln(export) 2013				-0.178 (0.168)				0.290* (0.159)
Observations	696	696	696	696	1209	1209	1209	1209

Notes: All models are estimated using PPML. Models include firm and year dummies. Statistical significance: \*p<.1; \*\*p<.05; \*\*\*p<.01. Robust standard errors clustered by firm in parentheses. All models use CEM weights. Yearly data from 2010-2018, treatment starts in 2014 in all models.

## 4.2 Study II: multiple case study on Estonian dairy firms

To look deeper into productivity as a proxy of firm resilience after an export shock and examine the role of firm-level capabilities, we now conduct a multiple case study of three Estonian dairy exporters heavily affected by the 2014 Russian embargo. The three sample firms in our multiple case study have common characteristics but also clear differences. In 2013, just before the embargo, 25% of Estonian dairy exports went to Russia (Josing 2014). The Estonian dairy sector had focused on the large and proximate Russian market since the Soviet era when the Estonian dairy produce was considered among the best in all of the Soviet Union (CEO interviews). Due to this high-quality image, historically developed taste preferences, geographical proximity, and consumer income growth since the 2000s, Russia remained a convenient and profitable market for Estonian producers up until the 2014 embargo. According to the CEO of Firm B "Russia was the only place in the world where consumers thought that

cheese produced in Estonia is better than the one from Switzerland, Germany or the Netherlands”, whereas the negative Eastern European transition country image of Estonia had made entering the Western European markets difficult. Table 4 shows key characteristics of the three sample companies before the 2014 embargo. All of them trace their roots back to the Soviet era industries, which had become outdated and amortized by their privatization in the 1991 re-independent Estonia. For all three Russia still represented an important export market in 2013, constituting around 84% of exports for Firm A, 37% for Firm B, and 39% for Firm C. Firm C was the largest of the three and part of a large Finnish multinational dairy company. Firm B was a co-operative with a high export-orientation. Firm A was the smallest of the three and a co-operative located on an island off the mainland Estonia.

**Table 4.** Sample firms’ characteristics in 2013

	Firm A	Firm B	Firm C
Business type	Small cooperative	Cooperative	Subsidiary of a large multinational
Export orientation	Medium	High	Medium
Number of employees	140	222	368
Revenue (‘000 000) EUR	26	48.2	76.5
Exports (‘000 000) EUR/Share of exports in revenue	8.6/33%	37.5/78%	31.2/31%
Share of Russia/non-EU countries in exports	84%/85%	ca 37%*/37%	39%/40%
Productivity (EUR/employee)	22 598	21 828	34 966
Product capabilities	Soft cheese, butter, fresh dairy	Soft cheese, butter, milk powder	Hard and soft cheese, fresh dairy

Source: e-Business Registry (2023); \*information from CEO

The official Russian embargo against the Western dairy products in August 2014 was preceded by a temporary export ban for the sample firms in January 2014 on phytosanitary grounds. Exceptionally for the cheese production facility of Firm C the ban already started in July 2013. The phytosanitary argumentations by the Russian side were largely artificially created and most presumably politically motivated.

Appendix 3 summarizes the key performance indicators of sample firms in 2012-2018. The Russian embargo had a clear negative effect on the export value to third countries and value-added statistics of the sample firms. A fall in total revenue occurs in 2015 for Firm B and C, and in 2014-2015 for Firm A. The share of non-EU markets (including Russia) in revenue clearly falls for all companies, but this statistic eventually starts to increase for Firm B. The post-shock fall of Firm A profitability illustrate the struggles that it faced compared to the other two firms.

Table 5 lists the main findings about the sample firms pre-embargo resources and firm-specific capabilities that determined their post-embargo adjustment opportunities. These findings are further explained in the firm-specific stories following the table. The information for the following findings in this section derive from the CEO interviews unless referenced by other resources.

**Table 5.** Case study firms’ pre-shock resources/capabilities, and post-shock adjustments

**Firm A*****Pre-shock resources and capabilities***

Restricted inputs, production capacity and marketing resources

Opting to limited strategic investments in the production capacity of the competitive advantage product

Low product diversification

Established intermediary-specific export experience to a profitable Russian market

Limited export markets and partnerships

***Post-shock adjustments***

Limited product switching, temporary switch to a low value-added export product for survival

Increased focus on home market

Low production capacity of competitive advantage product restricting new export opportunities

Inexperience in product-market certification restricting entry to new markets

Export survival through destination switching, but only by low value added and irregular/one-time sales through intermediaries

Limited success in rebranding as a niche high value-added organic producer and a refocus on Nordic Europe

**Firm B*****Pre-shock resources and capabilities***

Gradual investments into modernisation of complementary production facilities

Heavy investments on the profitable Russian market and subsidiary, while also developing and maintaining other export markets

Diverse experience in high-level product and market certification for entry

Participation and learning in international public-private business networks

Experience in R&D and cooperation with academia

Visionary CEO

***Post-shock adjustments***

Short-term product/market switching according to market conditions

Gradual product-market matching, long-term work on entering new distant and high-barrier, but profitable markets

Use of prior market entry/certification knowledge

Use of public and private networks for opening new markets

Transformative management vision of the CEO and empowerment by the organisation to follow it

**Firm C*****Pre-shock resources and capabilities***

Investments in increasing output at complementary production facilities

Possession of a key technology for a rare high-value product

Specialization and strategic development of rare high-value production capabilities

Marketing and brand cooperation with mother company with relative autonomy in business strategy

Strong image on the Russian market via mother brand

Strong presence in home and neighbouring markets

***Post shock adjustments***

Increasing share of value added and focusing on the production capacity of the rare high value-added product

Finding a market niche and new markets for its rare high value-added product

Source: CEO interviews; e-Business Register 2023.

**Firm A*****Pre-shock resources and capabilities***

The performance of Firm A was in part pre-determined by several firm-specific constrictions. Due to its insular location, raw milk procurement is limited to only dairy cooperatives located on a 3,000 square kilometre island and its close neighbourhood. This creates a clear limit on achieving scale efficiency. The CEO positioned the firm as a regional industry to provide its cooperative dairies a high price for raw milk. The industry produced butter (mostly sold on the home market) and a relatively homogenous selection of soft Dutch-type of cheese that were the

main export items. The Soviet-era production facilities had been gradually modified and expanded. However, they remained less efficient and low scale compared to modern greenfield factories, or even to the ones of the other two sample firms. An additional obstacle in the development of Firm A was the conflict between the owners (managers of cooperatives) and the industry CEO. Although Firm A's finances were permanently restricted, the CEO holds that the co-operative's leadership rejected his financially sustainable investments into the increased production capacity of its highest value-added product, cheese.

Before the embargo, Firm A only exported to close neighbourhood: Russia (84% of exports and 28% of revenue in 2013), Finland (13% of exports in 2012), Latvia, and Lithuania (e-Business Register 2023). Exporting occurred through intermediaries without resources or intent for direct entry or marketing.

Firm A exported to Russia through a single intermediary with whom it had formed a stable and trustworthy relationship, which benefitted from the partners' common cultural-linguistic background. It sold blocks of cheese to the intermediary, who took care of everything else from small packaging to distribution. Exports to Russia before the embargo were soaring and the production capacity could not keep up with the demand (+34% year-on-year in 2012). The CEO admitted that there was a sort of a comfort zone as the convenient sales on the Russian market did not necessitate working on other export markets.

#### *Post-shock adjustment*

Following the embargo, Firm A resorted to survival through small one-time sales to different intermediaries as it had no other options. This resulted in less profitable trade diversion to neighbouring EU markets, e.g. four new EU countries and Azerbaijan (e-Business Register 2023). Another coping mechanism was to start producing a low-value-added but in-demand type of cheese *cagliata*, which served as inputs for Mozzarella production in Italy, increasing the share of this country in the firm's 2016 exports to 40%. Firm A initially joined Firm B's larger sample cheese cargo to Japan; however, the CEO of Firm A admitted it could not meet the production volumes or standards in markets like Japan.

The interviewed CEO left Firm A in March 2015 for retirement. In 2015-2020 Firm A had two new CEOs that experimented with new fresh dairy product lines without much success or stable export relationships comparable to the previous one with Russia. The strong presence in the home market has helped the company to survive. In 2021, the company invested in increasing its raw milk intake and cheese production capabilities. However, the firm's profitability levels have remained low (appendix 3). In 2022 there were media reports about negotiations on Firm A being sold to a larger dairy industry, in 2023 reports stated that these negotiations were terminated.

### **Firm B**

#### *Pre-shock resources and capabilities*

Firm B is a co-operative formed in 1997 by merging milk producers with rather amortized Soviet-era facilities. Similar to the two other sample firms it produced soft cheese and butter, but one of its facilities had historical experience in producing powdered milk that has a longer expiry period and lower transport costs compared to fresh dairy. In 2011-2013 powdered milk factory was modernized, which doubled output and enabled the production of specialty powders (e.g. whey, skimmed milk, and a rarer high-value niche powder from demineralised whey) and

frozen cream. Adding value to whey (a by-product of cheese production that was previously disposed of) vastly increased profitability.

Compared to other sample firms Firm B was also relatively innovative, which to a very large extent also resulted from the CEO's strategic vision and the ability to implement it. He had a clear vision that the export markets and the product portfolio must be diversified. In order to create prerequisites for the improvements in the applied technology and the product portfolio, the management of Firm B paid great attention to cooperation with various research partners both in Estonia and abroad. Already in 2004 Firm B jointly with universities and private partners established a competence centre for developing functional dairy products. For example, their product development led to the launch of a probiotic cheese with scientifically proven health benefits. This trademarked cheese later received a special marking by the Russian Food Institute which cleared the product's way to large Russian supermarket chains.

Firm B also had received other internationally recognized dairy product quality certifications. Moreover, it had direct business networks with large Western European dairy companies and had passed high level certifications to provide input dairy products to a global scale chocolate producer. The CEO of Firm B actively participated in national and European industry associations and engaged with public agricultural policy makers.

Firm B was highly export oriented with an export to revenue ratio of 70.8% in 2012 and 77.7% in 2013. In 2012, its main export markets were Russia and the EU. Finland was its main EU market where it had direct contracts with large supermarket chains. Some sales were reportedly made to Africa and Asia. (e-Business Register 2023)

Russia was still a special and profitable market for the direct sale of final products. By the manager's account, Firm B's brand in Russia was very strong and comparable to much larger multinationals (e.g. Firm C's mother). There was still a strategic decision to limit sales to Russia up to 30% - the disappearance of which would be tough but "survivable". In 2012, Firm B obtained a subsidiary factory in Russia, followed by contracts to sell in supermarkets across the country. Sales and profits were heading upwards until the closure of the Russian market in 2014.

#### *Post-embargo adjustments*

Following the embargo, firm B's Russian subsidiary was temporarily used for marketing cheese ordered from Belarus under its own brand, but this scheme was disallowed in a few months. Giving up on the Russian market where it had invested heavily was extremely difficult and took some time.

Immediate reactions to the embargo included producing less fresh soft cheese and more powdered milk with a longer expiration date. In early 2015 Firm B laid off 40 employees serving the Russian market. The CEO finds that Firm B "has been saved" several times by continuously maintaining sales to different markets and networks, even if on low volumes. In the short-term the neighbouring Finnish market could be relied on for survival.

Longer-term plans to replace the Russian market focused on entry to Asia with increasing purchasing power and the Westernization of food preferences. Japan was targeted as a destination market for cheese and China was seen as a market for powdered milk. The choice was strategic as Asia did not have a negative connotation to Eastern European food products like in Western Europe, yet it had more purchasing power than Africa.

National bilateral trade barriers to Japan were quickly overcome thanks to co-operation with Estonian public authorities and ministries. In March 2015 Firm B sent a sample load of cheese to Japan. According to the CEO the company-specific certification was still cumbersome, and the company was just about to give up before receiving the final clearance. In early 2017, Firm B signed the first regular contract for 500 tons of cheese to Japan, which was gradually renewed. Permission for exporting whey powder to China was received in early 2018 after nearly four years of continuous work.

Firm B's adjustment process was also benefitted by its existing international networks, and experience in market and product certification. Firm B's cooperation with a large Western European dairy mediator with a global reach already started in 1996 and the partnership later grew into multidisciplinary cooperation and a source of technology transfer as well as marketing. In fall 2015, Firm B's cooperative was joined by a Latvian dairy and in 2019 Firm B founded the Baltics' first EU dairy cooperative (formally European Cooperative Society, SCE) that facilitates cross-border business activities with a Latvian partner that mainly focuses on complementary fresh dairy products. In 2018, Firm B started producing special organic whey powder from inputs by a Nordic cooperative that created a new product niche.

In 2017, the CEO was already quoted in the media saying that "there is definitely reason to thank Russia for the embargo", as it created the necessity to find alternative markets. The CEO says that all strategic investments are voted in the cooperative's board and that he has been able to fulfil his strategic long-term plans. Already in 2012, the CEO started pursuing a new modern and large multifunctional factory to add more value to the region's raw milk. The 100-million-euro project received 15 million euros of public funding in 2017 and its construction lasted from 2021-2023. To finance the project faced with increasing construction costs Firm B sold a minority share of its industry to its old and internationally established Western European partners that also provided technological know-how and are set to remain partners for product marketing.

## **Firm C**

### *Pre-shock resources and capabilities*

Firm C is the largest of our sample firms and a subsidiary of an even larger multinational that is one of the biggest food exporters in Finland. Firm C has two production sites, one for fresh dairy products and the second for cheese. The mother company acquired the two separate facilities to solidify its presence in Estonia with complementary products. In 2013, Firm C produced a wide selection of dairy products (e.g. drinking milk, cream, yoghurt, curd, cottage cheese) and soft (e.g. Emmental) and parmesan-like hard cheese. The latter was a relatively higher value-added product unique in the region and its production technology was inherited from the factory's previous Italian owners.

The fresh dairy products served the home and neighbouring Baltic markets, while soft cheese was also sent to more distant markets under a brand of the mother company. The rare hard parmesan-type cheese was exported to a partner associated with the firm's old Italian owners. The Italian partner provided the input leaven for the parmesan-type cheese and received the raw product, meaning that the ageing process continued in Italy. This cooperation stopped after business disagreements in 2012. After some effort, Firm C found an alternative Italian leaven supplier and started to age the cheese in its facilities in 2014.

The predecessor of Firm C was historically set up in the 1960s primarily to serve the Russian market. Its current mother company also had a powerful presence, brand, and a Russian subsidiary, which represented the Firm C's main distribution channel. The established focus in Russia was soft cheese; however, fresh dairy exports were also increasing in the years preceding the embargo.

### *Post-shock adjustment*

For Firm C, sanctions were introduced by Russia already in July 2013 with a factory-specific ban on its cheese products due to alleged phytosanitary violations. In August 2014, the complete closure of the Russian market to fresh dairy products for Western countries followed. The CEO of Firm C finds that the earlier and gradual closure of the Russian market for Firm C softened the blow of the export shock. The adaptation process was also supported by balancing the production of fresh produce and cheese based on the market conditions and prices.

After the ban on cheese, Firm C immediately started working on new markets with a focus on exporting hard parmesan-type of cheese to Italy. The Russian ban did not initiate but supported Firm C strategic plan to increase its share of value-added in the production of hard cheese. From 2013 onwards Firm C gradually started ageing, preserving and packaging the hard cheese. The CEO was personally engaged in this transitory process and the firm hired a local sales representative in Italy to find new direct clients. Firm C's market niche in Italy was providing a parmesan-like cheese as a cheaper substitute for the local parmesan cheese with geographical indications and restricted supply. This enabled the Italian partners to broaden their product portfolios with cheaper Parmesan substitutes both domestically and abroad. In 2015, Firm C doubled its sales to Italy and the market constituted a fourth of its exports. From there on Firm C generally positioned itself to focus mainly on more distant European markets with hard cheese, while the neighbouring region remained important for other products.

## **5. Discussion**

Our quantitative results conform to the previous findings about Western trade diversion to other markets after the 2014 Russian import ban (Cheptea and Gagné 2020; Kutlina-Dimitrova's 2017; Lastauskas et al. 2023), but we specify that the average effect is larger for firms with higher pre-shock productivity and exposure to Russia. While productivity has been shown to be a good predictor of firm resilience after increased competition due to trade shocks like trade liberalization (Bernard et al. 2003; Melitz and Ottaviano 2008; Melitz and Trefler 2012) or general demand shocks (Lewrick et al. 2018; Foster et al. 2016), our results illustrate that productivity is also on average a good predictor of firm performance after a demand shock deriving from the complete unexpected closure of a firm's major export market.

While the results of our multiple case study into dairy exporters highly affected by the Russian embargo generally conform to the prior quantitative findings, they also illustrate the importance of key firm-level resources and capabilities that are not necessarily visible in the productivity proxy but are nevertheless necessary for successful post-shock adjustments. This notion becomes apparent by the observation that two (Firm A and B) of our multiple case study firms had a similar pre-shock level of productivity, with one of them adjusting successfully and diverting exports (Firm B), and the other struggling and failing to find substitute markets of similar magnitude (Firm A).

Based on these observations, we propose the following key firm-level resources and capabilities

that enable adjusting to a negative trade shock: the quality of exporting experience, competitive product-market matching, absorptive capacity, and managerial vision and empowerment. Table 6. lists and briefly describes these key firm-level resources and capabilities.

**Table 6.** Key firm-level resources and capabilities for post-shock adjustments

Firm-level resources/capabilities	Firm A	Firm B	Firm C
Quality of exporting experience	Only through mediators and limited number of partners	Experience in direct exporting to many markets, network of private/public partners	Experience in direct exporting supported by strong mother company brand
Competitive product-market matching	Limited strategic investment in key products/identification of target markets	Matching different products to suitable markets	Focusing on key product on niche international market
Absorptive capacity	Limited in-house development/cooperation with third parties	Co-operation with research institutions/international private and public networks	Gradual learning by doing in key product value chain
Managerial vision and empowerment	Limited managerial strategic vision, limited autonomy of CEO	Transformative managerial vision supported by owners	Managerial identification and focus on key product and autonomy from mother company

Firstly, our multiple case study demonstrates the importance of the quality of firm-level exporting experience and partnerships. While export experience could quantitatively be measured by the number of years or markets, these statistics do not account for the fact that the natures of markets and channels of entry to different markets vary in complexity. Therefore, firms with prior experience in addressing market-specific barriers or partner-specific certifications are better prepared for negative demand shocks than firms with limited market-partner combinations. These inferences relate to the findings of Bai et al. (2017) about direct exporters outperforming indirect exporters, or Brambilla et al. (2012) about exporters to high-income markets demanding more skill-intensive export services. We conclude that even among different export modes or destination market income levels, the firm-level export experiences can differ due to complexities associated with overcoming market-specific non-tariff barriers.

The second key capability relates to the firm's competitive product-market matching that consists of simultaneous choices about product and destination switching. Results of Study II show that successful post-shock adjustment can occur both by widening or narrowing its product portfolio. However, the product portfolio must also be matched to the correct markets. Our two successful case study firms employed different strategies, one identifying and focusing on its competitive advantage product in a niche export market and the other simultaneously diversifying its complementary product portfolio to unique markets. The unsuccessful company had limited focus on its potential competitive advantage product before the shock, and it also found it difficult to position itself on new markets after the closure of its single most important export destination. These propositions conform to stylized international trade literature conclusions about firms switching products (Bernard et al. 2010; Iacovone and Javorcik 2010; Mayer et al. 2014) or diverting trade (Lastauskas et al. 2023; Cheptea and Gagné 2020; Kutlina-Dimitrova 2017) after a negative demand shock on one market, while stressing that the firms' abilities to conduct these adjustments are limited by their pre-shock product-level capabilities and the ability to identify suitable markets.

Thirdly, we highlight the importance of firm-level absorptive capacity gained through

cumulative experience before the shock. This conclusion partly supports the literature on the positive relationship between firm-level innovation/R&D intensity and better performance after negative shocks (e.g. Aghion et al. 2005; Lee et al. 2009; Lome et al. 2016; Makkonen et al. 2014). Our case study results emphasise the role of firm-level absorptive capacity in its broader sense, similar to Cohen and Levinthal (1990). This includes in-house (innovation activities, patents) and external knowledge sources (private and academic R&D cooperation, private and public business networks as learning networks) as predictors of firm resilience to a negative export shock. The pre-existence of both the internal and external absorptive capacity is especially relevant as these capabilities are difficult to build rapidly in response to an unexpected shock. In this we can also see a degree of path-dependency as the firms' adjustment options to the exogenous shock are pre-determined by their existing absorptive capabilities.

The final and overarching key capability in our results is managerial vision and autonomy. Similar to Temel and Forsman (2022) highlighting the role of managerial perception of the crisis facing the firm, our results point out the critical role of the CEO in firms' effective post-shock adjustments. We find that the pre-shock strategic organisational vision and risk management of the successful firms' CEOs eventually enabled effective post-shock decisions and trade diversion to new markets. Besides that, it was crucial that the CEO could follow their stakeholders' vision. Followingly, we claim that the managerial capabilities could also be a crucial determinant of firm resilience that can remain hidden in the typical quantitative firm productivity measures.

From a policy perspective our findings are relevant in the current global geopolitical situation where protectionism is on the rise and trade sanctions have become a prevalent foreign policy tool. In this context of increasing uncertainty firm resilience through the existence and development of key capabilities become even more important for firms, especially since building new capabilities or breaking the path dependency is extremely difficult and time-consuming. Policy makers have an important role in supporting their businesses in the continuous development of these capabilities to be ready for trade policy shocks and provide assistance in post-shock adjustments or overcoming non-tariff barriers. In addition to general non-tariff barriers that are for example already addressed by modern EU free trade agreements, firms in industries like dairy still have to overcome different market-, product- or partner-specific certifications or form partnerships that might require more support by the public authorities. In a broader perspective, export resilience or trade promotion measures should not be viewed in isolation of policies aimed at improving and diversifying the firms' knowledge base and encouraging co-operation with private, public and academic partners, as the two channels complement each other.

## **Conclusions**

The prevalence of trade sanctions due to geopolitical tensions requires firms to be ready for unexpected policy shocks. This paper investigates the effect of the 2014 Russian embargo on the exports and productivity on Estonian firms that had previously exported embargoed goods to Russia. The paper's Study I quantifies both the immediate (2014) and intermediate-term (2014-2018) firm-level effects. Study II focuses on three case study firms from the Estonian dairy sector that were heavily affected by the embargo. All three sample firms had historically relied on the Russian market, but they had also developed some distinct resources and capabilities before the start of the embargo. The mixed methods approach of our analysis enables us to draw connections between firm-level productivity proxies the less clearly quantifiable firm-level resources and capabilities essential for effective post-shock adjustments.

The results of Study I show that the Russian embargo resulted in immediate trade diversion among firms affected. Embargoed firms with higher productivity levels and exposure to Russia exhibited higher trade diversion rates both in the short- and intermediate term. These findings demonstrate that initial productivity is on average a good predictor of firm success after the complete closure of major export market.

Study II identifies the firm-level resources and capabilities that determined the post-shock adjustments of the three sample firms. We conclude that the key firm-level resources and capabilities that the two successfully adjusted firms possessed were quality of exporting experience, competitive product-market matching, absorptive capacity, and managerial vision and empowerment. These resources and capabilities are especially crucial for firm resilience because they are difficult and time consuming to develop, which makes their existence important in case of exogenous trade shocks like embargoes.

Our findings present some important policy lessons regarding the effects of exogenous trade shocks, while also providing input for future research. It is in the interest of policymakers to increase the resilience of their companies to policy shocks that might be unavoidable due to the geopolitic conditions. However, firm-level resilience building is a long and continuous process that might not be possible in the short-term. Potential polic measures could target expanding the knowledge base and different co-operation networks between the private, public and academic sectors. Future research could further expand on both the more detailed aspects and firm characteristics in the quantitative firm-level effects of similar trade shock or on the qualitative inquiry into a broader range of companies' adjustments to negative trade shocks.

## 6. Appendices

### Appendix 1. Coarsened exact matching (CEM) statistics in Study I

Variable		Mean Treated	Mean Control	Bias (%)	Reduction in bias after matching (%)	Test p>t
Number of employees	Unmatched	135.19	48.966	48.6	57.5	0.000
	Matched	135.19	98.521	20.7		0.338
ln(Total revenue)	Unmatched	15.676	15.091	37.5	90.9	0.123
	Matched	15.676	15.623	3.4		0.892
ln(Total exports)	Unmatched	17.625	15.833	89.1	73.8	0.004
	Matched	17.625	17.156	23.3		0.243
Number of export markets	Unmatched	5.875	7.8492	-28	48.8	0.346
	Matched	5.875	6.8858	-14.4		0.626
Share of Russia in exports	Unmatched	44.66	39.264	13.7	42	0.600
	Matched	44.66	41.531	7.9		0.765
ln(Value-added per employee)	Unmatched	9.6865	9.8614	-12.2	33	0.709
	Matched	9.6865	9.5693	8.2		0.855
Sample	Ps R2	chi2	p>chi2	Mean Bias	Median Bias	
Unmatched	0.252	33.36	0	38.2	32.8	
Matched	0.065	6.64	0.356	13	11.3	
	Control	Treatment	Multivariate L1 distance			
Number of matched firms	136	16	0.942			
Number of unmatched firms	222	0	0.994			

### Appendix 2. Interview form of Study II

Please describe your previous general exporting experience and exporting to the Russian market before 2014.

- Which channels did you use for exporting (to Russia)?
- What products/product groups did you export (to Russia)?
- Since when did you export to (or import from) the Russian market?
- What made the Russian market special or different from other markets?
- How important was the Russian market to your firm prior to 2014? Why?
- What were your strategic plans (with the Russian market)?

Please describe how did the Russian export ban in early 2014 (based on the grounds of phytosanitary violations) affect your company?

- How did the export ban affect your firm's exports to Russia?
- How did you react to the ban? Did you look for ways to continue exporting to the Russian market through other countries?
- Did you work on reorientation of exports towards other markets?

- Did you hope to receive the necessary certificates for exporting and still expect to return to the Russian market?

Please describe your company's activities after the official Russian embargo on imports from the European Union in mid-2014.

- How did your firm adjust?
- Which type of adjustments did you implement in the short term?
- Which firm-level resources/capabilities enabled these responses?
- The lack of which firm-level resources/capabilities restricted your firm's short-term responses?
- What were the main external/business environment factors that restricted your firm's potential responses?
- How did the shock and firm-level responses to it affect your firm's performance in the short- and long-run?
- What did you learn from this shock?

### Appendix 3. Firm-level statistics 2012-2022 of sample firms in study II

<b>Firm A</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Number of employees	131	140	135	130	141	139	142	102	102	100	89
Net income	0.1	0.1	-0.6	0.2	0.7	0.5	0.0	-0.7	-0.7	-0.8	0.9
Value-added per employee	0.021	0.023	0.019	0.027	0.029	0.029	0.021	0.025	0.027	0.025	0.049
Investments	1.1	1.9	0.2	0.3	0.4	0.6	4.0	0.6	0.7	N/A	N/A
Total revenue	23.2	26.0	24.7	23.5	25.8	30.2	30.7	23.9	22.7	25.9	33.8
Exports	6.5	8.7	4.8	5.7	8.0	8.3	8.5	7.9	7.4	11.1	14.9
Extra-EU exports	5.6	7.4	0.7	1.1	1.1	1.3	1.1	0.6	0.9	0.9	0.4
Exports to Russia	5.6	7.2	0.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Exports to EU	0.9	1.3	4.1	4.6	6.9	7.0	7.3	7.3	6.5	10.2	14.4
Sales in Estonia	16.7	17.4	19.8	17.8	17.8	21.9	22.2	16.0	15.3	14.8	18.9
<b>Firm B</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Number of employees	195	222	218	184	187	185	184	195	191	183	186
Net income	0.6	0.7	0.1	0.6	0.2	1.5	0.9	0.4	0.4	1.2	7.0
Value-added per employee	0.021	0.022	0.019	0.028	0.027	0.035	0.033	0.029	0.031	0.036	0.068
Investments	1.5	3.4	2.0	4.0	1.5	1.4	1.6	3.4	1.5	22.6	78.6
Total revenue	43.2	48.2	48.6	37.0	37.6	47.3	46.6	49.1	52.4	54.4	77.7
Total exports	30.6	37.5	33.6	27.5	26.7	35.4	35.2	36.6	39.0	39.7	62.0
Extra-EU exports	7.7	14.0	5.9	3.2	0.7	3.2	3.7	3.5	3.7	1.6	4.6
Exports to Russia	N/A	N/A (ca 14*)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Exports to EU	22.9	23.5	27.8	24.3	26.0	32.1	31.4	33.2	35.2	38.1	57.4
Sales in Estonia	12.6	10.8	15.0	9.5	10.9	12.0	11.4	12.5	13.4	14.8	15.8
<b>Firm C</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Number of employees	349	368	369	390	437	465	469	469	466	440	444
Net income	3.8	2.6	3.3	4.5	3.7	3.7	3.7	5.1	5.3	5.2	3.5
Value-added per employee	0.039	0.035	0.038	0.042	0.039	0.039	0.040	0.044	0.046	0.049	0.046
Investments	2.9	2.6	4.0	4.5	4.0	4.9	5.9	3.7	5.1	4.7	4.3
Total revenue	62.1	76.5	92.5	85.8	93.3	115.8	122.5	125.5	125.3	130.7	168.8
Total exports	7.4	15.1	28.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extra-EU exports	3.1	6.1	6.7	2.2	2.3	3.6	4.4	4.3	4.9	6.2	8.2

Exports to Russia	3.1	5.8	5.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sales in EU (including Estonia)	59.0	70.4	85.8	83.5	91.0	112.2	118.1	121.2	120.4	124.5	160.6
Exports to EU	4.3	9.0	22.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sales in Estonia	54.6	61.4	63.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes: All values in '000 000 EUR, except for Number of employees  
Source: e-Business Register (2023); \*information from CEO interview

## REFERENCES

- Aghion, P.; Bergeaud, A.; Lequien, M.; Melitz, M.; Zuber, T. 2022. "Opposing Firm-Level Responses to the China Shock: Horizontal Competition Versus Vertical Relationships", NBER Working Paper 29196.
- Aghion, P.; Bloom, N.; Blundell, R.; Griffith, R.; Howitt, P. 2005. "Competition and Innovation: An Inverted-U Relationship", *The Quarterly Journal of Economics*, 120, 2, 701-728.
- Angela Cheptea, Carl Gagné. 2020. "Russian food embargo and the lost trade", *European Review of Agricultural Economics*, 47, 2, 684-718.
- Autor, D.; Dorn, D.; Hanson, G.H.; Pisano, G.; Shu, P. 2020. "Foreign Competition and Domestic Innovation: Evidence from US Patents.", *American Economic Review*, 2, 3, 357-74.
- Bai, X.; Krishna, K.; Ma, H. 2017. "How you export matters: Export mode, learning and productivity in China", *Journal of International Economics*, 104, 122-137.
- Barney, J. B. (1991). "Firm resources and sustained competitive advantage", *Journal of Management*, 17, 1, 99-120.
- Barney, J.B. (2001), "Is the Resource-Based theory a useful perspective for strategic management research? Yes", *Academy of Management Review*, 26, 1, 41-56.
- Bernard, A.B.; Eaton, J.; Jensen, J.B.; Kortum, S. 2003. "Plants and Productivity in International Trade", *American Economic Review*, 93, 4, 1268-1290.
- Bernard, Andrew B., Stephen J. Redding, and Peter K. Schott. 2010. "Multiple-Product Firms and Product Switching", *American Economic Review*, 100, 1, 70-97.
- Blackwell, M.; Iacus, S.; King, K.; Porro, G. 2009. "CEM: Coarsened Exact Matching in Stata." *The Stata Journal*, 9, 524-546  
(<https://journals.sagepub.com/doi/10.1177/1536867X0900900402>) (Accessed 23/08/2023)
- Brambilla, I.; Lederman, D.; Porto, G. 2012. "Exports, Export Destinations, and Skills.", *American Economic Review*, 102, 7, 3406-38.
- Cohen, W. M., & Levinthal, D. A. 1990. "Absorptive capacity: A new perspective on learning and innovation", *Administrative Science Quarterly*, 35, 1, 128-152.
- Conz, Elisa; Magnani, Giovanna. 2020. "A dynamic perspective on the resilience of firms: A systematic literature review and framework for future research", *European Management Journal*, 38, 3, 400-412.
- Crozet, M.; 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. 2021. "Worth the pain? Firms' exporting behaviour to countries under sanctions", *European Economic Review*, 134.

- Dea.digar online database. 2023. Available at: <https://dea.digar.ee/?l=en> (Accessed 11/1/2024).
- e-Business Register. 2023. Administered by Estonia's Centre of Registers and Information Systems. Available at: <https://www.rik.ee/en/e-business-register> (Accessed 4/1/2024).
- Eisenhardt, K.M. and Martin, J.A. (2000). "Dynamic capabilities: what are they?", *Strategic Management Journal*, **21**, 1105–1121.
- Eppinger, P.S.; Meythaler, N.; Sindlinger, M-M.; Smolka, M. 2018. "The great trade collapse and the Spanish export miracle: Firm-level evidence from the crisis", *The World Economy*, **41**, 2, 457-493.
- European Commission (2024). "Russian import ban on EU products". Available at: [https://food.ec.europa.eu/horizontal-topics/international-affairs/eu-russia-sps-issues/russian-import-ban-eu-products\\_en](https://food.ec.europa.eu/horizontal-topics/international-affairs/eu-russia-sps-issues/russian-import-ban-eu-products_en) (Accessed 9/2/2024).
- Foster, L.; Grim, C.; Haltiwanger, J. 2016. "Reallocation in the great recession: cleansing or not?", *Journal of Labor Economics*, **34**, S1, 2, 293-331.
- Griffith, R., Redding, S., & Van Reenen, J. 2003. "R&D and absorptive capacity: From theory to data", *The Scandinavian Journal of Economics*, **105**, 1, 99-133.
- Hunziker, S. Blankenagel, M. 2021. "Research Design in Business and Management", Springer eBook. <https://doi.org/10.1007/978-3-658-34357-6>
- Iacovone, Leonardo; Javorcik, Beata S. 2010. "Multi-product exporters: Product Churning, Uncertainty and Export Discoveries", *The Economic Journal*, **120**, 481-499.
- Iacus, S. M.; King, G.; Porro, G. 2012. "Causal Inference Without Balance Checking: Coarsened Exact Matching", *Political Analysis*, **20**, 1, 1-24.
- Josing, M.; Hein, P.; Nittim, K.; Vanamölder, A.; Viileberg, M. 2014. "Impact analysis of the Russian embargo", Estonian Institute of Economic Research; commissioned by the Ministry of Agriculture of the Republic of Estonia.
- Kim, Linsu. 1980. Stages of development of industrial technology in a developing country: A model", *Research Policy*, **9**, 3, 254-277.
- Lastauskas, P.; Proškute, A.; Žaldokas, A. 2023. "How do firms adjust when trade stops?", *Journal of Economic Behavior and Organization* **216**, 287-307.
- Lee, S-H.; Beamish, P. W.; Lee, H-U.; Park, J-H. 2009. "Strategic choice during economic crisis: Domestic market position, organizational capabilities and export flexibility", *Journal of World Business*, **44**, 1, 1-15.
- Lewrick, U.; Mohler, L; Weder, R. 2018, Productivity Growth from an international trade perspective", *Review of International Economics*, **26**, 339-356.
- Lileeva, A.; Trefler, D. 2010. "Improved Access to Foreign Markets Raises Plant- level Productivity. . .For Some Plants." *Quarterly Journal of Economics*, **125**, 3, 1051-1099.
- Lockett, A., Thompson, S.; Morgenstern, U. 2009. "The development of the resource based view of the firm: A critical appraisal", *International journal of Management Reviews*, **11**, 1, pp. 9–28.
- Lome, Ola; Heggseth, Alf Gunnar; Moen, Oystein. 2016. "The effect of R&D on performance: Do R&D-intensive firms handle a financial crisis better?", *Journal of High Technology Management Research*, **27**, 1, 65-77.

- Lukk, J. 2016. Dairy industry review 2016. Ministry of Rural Affairs. Available at: <https://www.agri.ee/sites/default/files/content/ylevaated/2016/ulevaade-piimatoostus-2016-04.pdf> (Accessed 4/1/2024).
- Lukk, J. 2017. Dairy industry review 2017. Ministry of Rural Affairs.
- Makkonen, H.; Pohjola, M.; Olkkonen, R.; Koponen, A. 2014. "Dynamic capabilities and firm performance in a financial crisis", *Journal of Business Research*, 67,1, 2707-2719.
- Manova, K.; Zhang, Z. 2012. "Export prices across firms and destinations", *The Quarterly Journal of Economics*, 127, 1, 379-436.
- Mayer, T.; Melitz, M.J.; Ottaviano, G.I.P. 2014. "Market Size, Competition, and the Product Mix of Exporters", *American Economic Review*, 104, 2, 495-536.
- Melitz, M.; Ottaviano, G.I.P. 2008. "Market Size, Trade, and Productivity," *Review of Economic Studies*, 75, 1, 295-316.
- Melitz, M.J.; Trefler, D. 2012. "Gains from Trade When Firms Matter", *Journal of Economic Perspectives*, 26,2, 91-118.
- Pavcnik, N. 2002. "Trade Liberalization, Exit, and Productivity Improvements: Evidence from Chilean Plants", *The Review of Economic Studies*, 69, 1, 245-276.
- Porter, M. 1985. *Competitive advantage*. Free Press. New York.
- Sagi, Judit; Nikulin, Edward Evgenevich. 2017. "The Economic Effect of Russia imposing a food embargo on the European Union with Hungary as an example", *Studies in Agricultural Economics*, 119, 85-90.
- Santos Silva, J. and S. Tenreiro. 2011. "Further simulation evidence on the performance of the Poisson pseudo-maximum likelihood estimator," *Economics Letters*, 112, 2, 220-222.
- Teece, D.J.; Pisano, G. 1994. "The dynamic capabilities of firms: an introduction", *Industrial and Corporate Change*, 3, 537-556.
- Teece, D.J.; Pisano, G.; Shuen, A. 1997. "Dynamic Capabilities and Strategic Management", *Strategic Management Journal*, 18, 7, 509-533.
- Temel, S.; Forsman, H. 2022. "Growth and innovation during economic shocks: A case study for characterising growing small firms", *Scandinavian Journal of Management*, 38, 4, 1-11.
- Winter, S.G. 2000. "The satisficing principle in capability learning", *Strategic Management Journal*, 21, 10/11, 981-996.
- Winter, S.G. 2003. "Understanding dynamic capabilities", *Strategic Management Journal*, 24, 10, 991-995.
- Yoruk, Deniz E. 2019. "Dynamics of firm-level upgrading and the role of learning in networks in emerging markets", *Technological Forecasting and Social Change*, 145, 341-369.
- Zornitsa Kutlina-Dimitrova. 2017. "The economic impact of the Russian import ban: a CGE analysis", *International Economics and Economic Policy*, 14, 4, 1, 537-552.
- Zouaghi, Ferdaous; Sanchez, Mercedes; Martinez, Maria Garcia. 2018. "Did the global financial crisis impact firms' innovation performance? The role of internal and external knowledge capabilities in high and low tech Industries", *Technological Forecasting & Social Change*, 132, 92-104

## KOKKUVÕTE

### **Ettevõtte tasandi võimekused ja kohanemine negatiivsele ekspordišokile: 2014. aasta Venemaa embargo lääneriikide vastu**

Antud uurimus käsitleb ettevõtte tasandi ressursidele ja võimekustele, mis määravad ettevõtete võimalused kohaneda neile olulise ekspordituru äkitse ja ootamatu sulgumisega. Meie uurime sellist ettevõtete tasandil kohanemisprotsessi kasutades 2014. aasta Venemaa embargo näidet. Antud kaubanduspoliitilise otsusega tõkestati lääneriikide toidutoodete eksportimine Venemaa turule. Meie keskendumine embargo mõjude hindamisel Eesti ettevõtete andmestikule.

Käesolev uurimus kasutab uudset mitme-meetodilist lähenemist, mille Osa I kvantifitseerib embargo mõju kõigile enne šokki Venemaale eksportinud Eesti ettevõtetele, kasutades selleks standardset erinevus erinevustes (*difference-in-difference*) tüüpi mudelit. Sõltuvateks muutujateks on vastavalt mõjutatud ettevõtete ekspordiväärtused kõigisse sihtriikidesse ja kõigisse sihtriikidesse välja arvatud Venemaa või tootlikkus. Osa II kasutab mitmest juhtumiuuringu meetodit, kus vaadeltakse kolme Eesti piimatööstuse ettevõtet, kelle jaoks oli Venemaa enne 2014. aastat väga oluline sihturg. Osa II tugineb ulatuslikule dokumendianalüüsile, mis olid sisendiks ettevõtete juhtidega läbi viidud intervjuude jaoks.

Meie tulemused näitavad, et embargo kui negatiivse ekspordišoki eelne ettevõtte tootlikkuse tase on keskmiselt hea indikaator ettevõtte võimest šokile positiivselt reageerida või vastu pidada (Osa I). Osa II täpsustab, et ettevõtte tasandi ressursid ja võimekused, mis on taoliste šokkidele reageerimiseks vajalikud, ei pruugi standardsetes kvantifitseeritud tootlikkuse näitajates avalduda. Osa II järeldustena toome välja neli tüüpi ettevõtte tasandi resursse ja võimekusi, mis on embargo järel vastupidamiseks olulised: varasem ekspordikogemuse kvaliteet, konkurentsivõimeline toodete ja turgude sobitamine, teadmiste omandamise võime ning juhi visioon ja võimestamine.

Käesoleva uurimuse tulemused on olulised rahvusvahelise geopoliitilise olukorra tingimustes, kus kaubanduspoliitiline proteksionism ja kaubanduspoliitiliste meetmete kasutamine välispoliitiliste eesmärkide saavutamiseks on laialt levimas. Meie järeldused pakuvad poliitikaloojatele õppetunde, kuidas muuta oma erasektorit ootamatutele välismaistele nõudlusšokkidele vastupidavamaks. Lisaks mittetariifsete barjääride eemaldamisele on oluline toetada ettevõtete mitmekülgsete võimekuste järjepidevat arengut, sest nende tugevdamine on aeganõudev ja kriisisituatsioonis keeruline.