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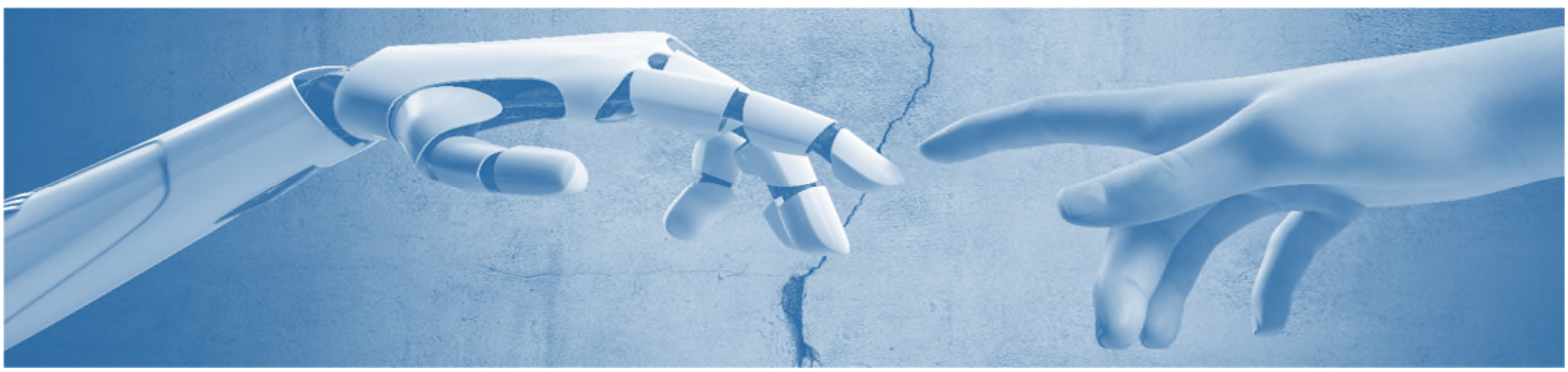

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Abstract

This study examines whether foreign direct investment inflows facilitate upgrading of export quality in host countries. The analysis focuses on the Russian Federation and uses customs data merged with firm-level information from Orbis. The results show a positive relationship between the quality of products exported by domestic firms and the presence of foreign affiliates in the upstream (input-supplying) industries. This relationship is present irrespective of export destination or foreign direct investment origin. The results are robust to using different proxies to measure product quality.

JEL: F14, F23, O24.

Keywords: Exports, Quality, FDI, Russia, Unit values.

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1 Introduction

The past decade has witnessed a slowdown in global flows of foreign direct investment (FDI). This has had and will continue to have profound implications for global value chains, international trade centered around multinationals and technology transfer across international borders. However, there are also less visible implications, such as the impact of FDI inflows on domestic exporters in host countries, which is the topic of this study.

Foreign affiliates affect the performance of local firms in host countries in a variety of ways. For instance, their presence in the upstream (input-supplying) industries may have a direct effect on domestic firms by providing them with higher quality intermediates and capital goods, which results in increased productivity and higher product quality.[1] The presence of FDI may also have an indirect effect: by increasing the level of competition in the input-supplying sector, it may induce local input producers to become more efficient or upgrade their production processes and thus offer more technologically advanced inputs.[2]

Moreover, the presence of foreign affiliates in the downstream (input-sourcing) industries may boost production quality among their local suppliers. This might be achieved, for example, by knowledge transfer from foreign affiliates to their local suppliers to facilitate production of cheaper or higher quality inputs.[3] Finally, domestic firms may learn from foreign affiliates that operate in the same industry. This could be happen either by observing the practices of foreign affiliates or hiring workers trained by them.[4] In this way, local firms may

[1] For instance, Javorcik et al. (2008) report that small Mexican producers meet with their input suppliers (usually foreign affiliates) every six months to learn about the possibilities of upgrading their products. Suppliers provide the necessary inputs and often prepare a new formula for the product based on these inputs.

[2] Several studies show that when firms have access to imports of high-quality and diverse inputs, there are significant gains in productivity (Amiti and Konings, 2007), export quality (Bas and Strauss-Kahn, 2015), and product scope (Goldberg et al., 2010).

[3] See a survey by Javorcik (2008) on Czech manufacturing firms showing that about 40% of domestic suppliers receive some kind of assistance from their multinational customers. Interestingly, becoming a supplier was the incentive to improve product quality for about half of these domestic firms. Javorcik (2004) also shows spillovers from FDI to the supplying industries. In addition, Javorcik et al. (2018) use the Hidalgo and Hausmann (2009) product complexity indicator to show that domestic firms are more likely to produce more complex products as a result of the increased FDI presence in the supplying sectors.

[4] Recent evidence from the Russian Federation show that firms with foreign affiliates have better management and better performance (Grover and Torre, 2019).

learn how to improve their product quality, use standardization, improve marketing skills, and enhance the reliability of their shipments (see, for instance, Haskel et al. (2007), Keller and Yeaple (2009), Poole (2013), Balsvik (2011)). FDI inflows also increase competition in the domestic market, which may force local firms either to improve or to exit.

Domestic firms may learn about the profitability of various export opportunities by observing their foreign peers' exports, and this could make them invest in quality upgrading, or developing new products. Thus, the presence of foreign affiliates may lead to reduction of export costs (Aitken et al., 1997), an increase in the amount and unit value of trade transactions (Chen and Swenson, 2007), help develop new export connections (Swenson, 2008), and expand export varieties (Sheng and Yang, 2016).

This study examines the impact of FDI on the quality of products exported by local firms in a country entered by FDI. The analysis focuses on the Russian Federation. I use detailed customs data recording Russia's exports at the level of the firm, 10-digit HS (Harmonized System) product classification, destination country and year. Due to the data I have at hand, the time period I examine is 2012-2016.[5] The export data are combined with firm-level balance sheets and ownership information. Although the balance sheet information covers 2007-2016, the ownership information is available to me only for 2012 and 2015. Thus, my analysis focuses on a long difference. I measure quality upgrading, defined as within-product improvements in export quality, in two ways. First, I focus on unit values of exports.[6] Second, I use the approach in Khandelwal et al. (2013), which builds on the work of Khandelwal (2010).[7]

[5]This time period includes trade sanctions imposed primarily by the United States and the European Union in 2014 against Russia, mainly affecting military and dual use exports. In contrast to the United States, existing export contracts in the European Union were exempted; the sanctions thus concerned only new contracts. Given that the sanctions affected only a handful of products and that this work focuses on export flows that existed prior to the sanctions being imposed, it is unlikely to have affected the conclusions of the study. Moreover, Russia prohibited imports of certain agri-food goods from these countries. Again, given the narrow focus of Russian countersanctions, there should be no concerns about their impact.

[6]Despite their shortcomings, export unit values have been extensively used as a proxy for quality, see, for example, Schott (2004), Hallak (2006), Bas and Strauss-Kahn (2015).

[7]The basic insight of this method is that, controlling for price, products that enjoy a higher market share are of higher quality.

The empirical analysis relates the change in the quality of product p exported by firm i to country c taking place between 2013 and 2016 and the change in FDI presence in the same, upstream and downstream sectors between 2012 and 2015. In other words, measures of FDI presence are lagged by one year with respect to the export outcomes.

The results show a positive and statistically significant relationship between the within-product quality upgrading in goods exported by Russian firms and the increased presence of foreign affiliates in the upstream (input-supplying) industries. I find that a one-standard-deviation increase in the foreign presence in the upstream industries is associated with a statistically significant 3% increase in the quality of exports of domestic firms. This relationship is present for exports directed to OECD countries as well as for exports destined for other markets. In addition, I find a positive relationship between the number of new export flows and the GDP per capita of the export market and the foreign presence in the sectors supplied by Russian exporters.

These results are important for policy makers wishing to upgrade exports, as they quantify the potential benefits of policies promoting foreign direct investment, particularly when focused in sectors that supply inputs to domestic firms. This study is most closely related to Bajgar and Javorcik (2020) who find a positive relationship between the quality of products exported by Romanian firms and foreign affiliate presence in the upstream (input-supplying) industries and to a lesser extent in downstream (input-sourcing) industries and the same industry. It is also related to the cross-country analysis of Harding and Javorcik (2012), which finds that sectors targeted by national investment promotion efforts tend to subsequently increase the unit values of exports, as well as to the work of Aitken et al. (1997), Chen and Swenson (2007), and Swenson (2008) mentioned earlier. A further contribution of this study is examining the difference between affiliates originating from developed versus other countries and by focusing on the change in the number of export flows and creation of new export flows.

The rest of the paper is organized as follows. The next section introduces the data and

Section 3 outlines the empirical model. The results from the main analysis and the heterogeneity analysis are presented in Section 4. Section 5 concludes with policy implications.

2 Data

2.1 Data sources

The main source of data for this study is the commercial database ORBIS compiled by the Bureau van Dijk. The data set I use contains the main financial indicators for firms operating in Russia in the period 2007-2016. It also contains very detailed information on ownership, which is however limited to the last available update. To obtain ownership information for the earlier points in time, I enhance the data set with two additional 'historical' exports from ORBIS. This includes a data export from 2012 (with ownership updated mostly in April and September of that year) and a data export from 2015 (with ownership updated mostly in July of that year) that are merged with the main data based on a unique firm identifier.

I combine the ORBIS data for manufacturing firms with detailed information on exports at the level of firm, 10-digit HS product, destination country and year, available for 2012-2016 from the Russian Customs. I am able to merge the export data with the ORBIS data based on a unique firm tax reference number, common to both data sets.

I also use the Russian input-output table for 2011. The input-output table follows the 3-digit NACE classification, while the ORBIS data include 4-digit NACE codes. This allows me to match the firm-level data with the information from the input-output table.

2.2 Variable definitions

2.2.1 Product quality

I use two proxies for the quality of exports. The first proxy is the unit value (i.e., the monetary value divided by the physical weight). I focus on a very narrow product definition,

namely 10-digit HS products. Although unit values are a commonly used proxy for product quality, they may be contaminated by high markups.[8]

Therefore, I also use another proxy, a measure suggested by Khandelwal et al. (2013), which builds on the work of Khandelwal (2010). The latter paper combines information on prices and physical quantities to infer quality, based on the insight that the ability of an exporter to sell a larger quantity at a given price should imply higher quality. Khandelwal et al. (2013) identify the relationship between quantity and price by assuming specific elasticities of substitution.

The quality measure is inferred from the OLS residual obtained by estimating:

$$\log q_{ipct} + \sigma \log p_{ipct} = \alpha_p + e_{ipct} \tag{1}$$

where q_{ipct} and p_{ipct} are the quantity and the price, respectively, of exports of product p by firm i to destination country c in year t, σ represents the assumed elasticity of substitution and α captures time-invariant product characteristics. I refer to this quality estimate as $\hat{Q}$ in all the tables.[9]

Both proxies are defined at the firm-product-destination-year level. The two measures of quality are closely related. Across the sample, their correlation is 0.90 in levels and 0.78 in differences. The relationship between the two measures is also illustrated in Figure 1 (see the left panel for levels and the right panel for first differences). Table A1 lists the top 20 and the bottom 20 products in terms of changes in unit values.

Figure 2 plots the distribution of unit values and the alternative quality measure among domestic and foreign exporters. It is clearly visible from the plots that foreign affiliates tend to export products with higher unit values and higher quality measure.[10]

[8] In other words, high unit values may reflect high markups rather than superior quality.

[9] Following the literature, I assume σ to be equal to 5.

[10] Differences in distribution of unit values could be driven by differences in the composition of exports across products. This is, however, not true when the alternative measure is used, as it has been purged of product fixed effects.

2.2.2 FDI presence

The data I use include ownership information for 2012, 2015 and 2016. Given the timing of the export data, I focus on ownership in 2012 and 2015. I define a firm as foreign owned if the Global Ultimate Owner (GUO) reported by ORBIS is foreign.[11] If the GUO is reported to be domestic or the GUO nationality is missing, I use information on shareholders of a given firm reported in ORBIS. I define a firm as foreign it has at least one foreign shareholder with more than 10% equity share.[12]

I define industry-level FDI presence based on the standard formula used in the literature:

$$OwnFDI_{st} = \frac{\Sigma_{i \in I_{st}} f_{it} Y_{it}}{\Sigma_{i \in I_{st}} Y_{it}} \tag{2}$$

where i denotes firm, s 3-digit NACE sector and t year. In addition, f_{jt} is an indicator variable for foreign owned firms and Y_{jt} is the operating revenue. Given the limited availability of the ownership information, I measure Own FDI at two points in time, namely in 2012 and 2015.

To capture vertical spillovers from FDI in the input-sourcing sectors, I rely on the assumption that a domestic firm is more likely to supply foreign affiliates – and benefit from vertical spillovers – if foreign affiliates account for a larger share of downstream industries' output. As in Javorcik (2004), I do not include inputs' sales within the firm's own sector, as this effect is captured by the Own FDI variable. Thus, this proxy will be capturing a lower bound on the effect of FDI in the input-sourcing industries. I define the downstream FDI measure as

$$DownFDI_{st} = \Sigma_{d \in S, s \neq d} \alpha_{sd} OwnFDI_{dt} \tag{3}$$

[11] A company's GUO is the individual or entity at the top of the corporate ownership structure, controlling at least 25.01% of that company.

[12] I exclude capital from 'tax havens' when defining foreign ownership. I treat the following countries as 'tax havens': Anguilla, Aruba, Bahamas, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Cook Islands, Curacao, Cyprus, Dominica, Gibraltar, Guernsey, Guyana, Hong Kong SAR China, Isle of Man, Jersey, Liberia, Lichtenstein, Luxembourg, Macao, Malta, Marshall Islands, Mauritius, Monaco, Montserrat, Nauru, Samoa, San Marino, Seychelles, Singapore, St. Kitts & Nevis, St. Vincent & Grenadines, Taiwan China, Turks & Caicos Islands, US Virgin Islands.

where α_{sd} is the share of intermediate inputs sold by industry s to industry d, according to the input-output matrix, and S is the set of all manufacturing sectors.

Similarly, I proxy for access to inputs produced by foreign affiliates by assuming that a Russian firm is more likely to buy inputs from a foreign affiliate if foreign affiliates account for a larger share of output in the upstream industries. Thus, the upstream FDI measure is defined as

$$UpFDI_{st} = \Sigma_{u \in S, s \neq u} \alpha_{su} OwnFDI_{ut} \tag{4}$$

where α_{su} is the share of the intermediate inputs by industry s which is purchased from industry u. Similarly, I exclude input purchases within the same sector, making the coefficient on Upstream FDI a lower-bound estimate.

Sectors with the highest values of FDI presence proxies in 2012 are listed in Appendix Table A2. In tobacco products, foreign affiliates account for almost all output. In pulp, wood pulp, paper and cardboard, they are responsible for three-quarters of production. In household appliances; fruits and vegetables; soap, cleaning, perfumery and cosmetics, foreign affiliates account for around two-thirds of production. Table A2 also lists sectors that saw the largest increase in FDI presence. These are flour and cereals; other electrical equipment; pharmaceuticals; furniture and machine tools.

3 Empirical model

The empirical model I employ relates the quality of 10-digit HS product p exported by firm j operating in sector s to country c in year t to the presence of foreign firms in the same, upstream and downstream sectors a year earlier. FDI variables typically enter with a one-year (or even a longer) lag because it takes time for the knowledge spillovers to take place. Using lags also mitigates endogeneity concerns. Thus, the empirical specification has the

following form:

$$\ln \text{ExportQuality}_{ipct} = \beta_1 \text{OwnFDI}_{st-1} + \beta_2 \text{UpFDI}_{st-1} + \beta_3 \text{DownFDI}_{st-1} + \gamma_{ipc} + \epsilon_{ipct} \quad (5)$$

The specification controls for firm-product-country fixed effects (γ_{ipc}) which means that it takes into account (i) the fact that an ounce of gold costs more than an ounce of steel, (ii) the possibility that some firms charge higher prices or export higher quality products than other firms, (iii) the possibility that firms may adapt product quality depending on the destination market. These fixed effects also take into account any time-invariant characteristics specific to firm, product and destination combinations. I transform this specification by differencing, which means that the fixed effect drops out. Thus, I obtain the following specification:

$$\Delta \ln \text{ExportQuality}_{ipct} = \theta_1 \Delta\text{OwnFDI}_{st-1} + \theta_2 \Delta\text{UpFDI}_{st-1} + \theta_3 \Delta\text{DownFDI}_{st-1} + u_{ipct} \quad (6)$$

This specification could be estimated in first or in longer differences. The data set I use is constrained in terms of foreign ownership information, thus my final specification will relate changes in unit values between 2013 and 2016 to the changes in FDI presence between 2012 and 2015. I cluster standard errors by industry, which is the level of aggregation of the FDI variables.

As I am interested in knowledge spillovers from foreign affiliates to domestic firms, I estimate the above specification on the sample of domestic firms. More precisely, I impose a restriction that firms are domestic in both 2012 and 2015.

4 Results

4.1 Baseline results

The baseline results, presented in Table 1, show a positive and statistically significant relationship between improvements in the quality of products exported by Russian firms and the

increasing presence of foreign affiliates in the supplying sectors. In other words, the greater the change in the foreign output share in industry s, the greater the quality improvement in Russian firm exports in industries supplied by s. This relationship is statistically significant when the proxy for foreign presence enters by itself as well as in the full specification including all three FDI proxies. This result holds both when the quality of exports is proxied with unit values and when the measure suggested by Khandelwal et al. (2013) is used.

The magnitude of the estimated effect is economically meaningful. Based on the results from column 4 in Table 1, a one-standard-deviation increase in FDI presence in upstream sectors is associated with a 3.4% increase in the unit value of exports. The corresponding magnitude for the alternative quality measure is 2.8%. As for the other proxies for FDI presence, although the estimated coefficients are positive, they do not reach conventional significance levels.

As a robustness check, I repeat the baseline specification on a full sample including exports by both Russian firms and foreign affiliates. My conclusions are confirmed and the estimated magnitudes are slightly larger (see Appendix Table A3).

4.2 Heterogeneity by export destination, FDI source, and industry concentration

In this section I explore whether the results are driven by the destination of the exports, the origins of the FDI and industry concentration. I differentiate between export destinations by separating the sample into exports to OECD and non-OECD countries. The results are presented in Table 2. As before, I find that the presence of foreign affiliates in the input-supplying industries matters for the quality of products exported by Russian firms. This relationship holds for both OECD and non-OECD markets. Indeed, the result is statistically significant for both measures of export quality, while the estimated magnitudes are very similar to those found in the baseline specification.

Another result that emerges from this analysis is that the presence of foreign affiliates

in the same industry matters, but only for the quality of goods exported by Russian firms to developed country markets. The estimated coefficients are highly statistically significant. This is true both when the FDI proxy enters by itself as well as in the full specification. The result holds for both measures of export quality. A one-standard-deviation increase in the FDI presence in the same sector is associated with a 5% and 7% increase in the quality of exports when the quality is proxied with unit values and the Khandelwal et al. (2013) measure, respectively.

Table 3 distinguishes between exports to neighboring countries and other destinations.[13] When I consider unit values, the results are confirmed, suggesting that foreign presence in the input-supplying sector is positively related to the exports by Russian firms. The estimated coefficients are highly statistically significant in all four specifications, but the magnitudes are twice as large when exports to non-neighbors are considered. Regarding the alternative measure of export quality, the effect of interest is statistically significant only when non-neighboring countries are being considered.

The ORBIS database contains information on the nationality of investors, which allows me to classify FDI as originating from developed countries versus the rest.[14] Germany, the United States and the United Kingdom are the top three source countries of FDI accounting for about 226, 126 and 104 foreign affiliates, respectively. This translates into about 21%, 12% and 10% of foreign affiliates within the grouping, respectively. They are followed by the Netherlands and Finland. The presence of FDI originating from non-developed countries is much smaller. In this group, China, Turkey and Belarus are the largest investors each with about 30 affiliates. They are followed by the Democratic People's Republic of Korea and Poland, with 25 affiliates each.

[13]The neighboring countries include: Azerbaijan, Belarus, China, Estonia, Finland, Georgia, Kazakhstan, the Democratic People's Republic of Korea, Latvia, Lithuania, Mongolia, Norway, Poland, and Ukraine.

[14]Although there is no one widely accepted definition of developed countries, I use the following list, based on the World Bank classification from the early 2010s, including: Austria, Australia, Belgium, Canada, Denmark, France, Finland, Germany, Greece, Iceland, Ireland, Italy, Israel, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, the Republic of Korea, Spain, Sweden, Switzerland, United Kingdom, and United States.

Thus, I recalculate the FDI proxies separately for the two types of FDI and include all of them in the estimating equation. As can be seen in Table 4, this augmented specification confirms the earlier results. I find a positive and statistically significant relationship between the change in Upstream FDI from developed countries and the quality of exports. The coefficients on Upstream FDI from other countries bear positive, but insignificant, coefficients. However, the F-test cannot reject the equality between the two. Thus, I cannot reject the hypothesis that the increase in all FDI, and not just FDI from developed countries, is associated with improving quality of exports.

Next, I check whether the industry concentration matters for the ability of firms to benefit from FDI spillovers. To do that, I calculate the Herfindahl-Hirschman Index (HHI) for 2012 and interact it with the FDI variables. The results are presented in Table 5. As before, I find a positive coefficient on Upstream FDI, which is statistically significant in three of four specifications. There is also some indication of possible positive effects associated with FDI in the same sector and in downstream sectors, but these results are not very robust.

4.3 FDI and other outcomes

In this section, I consider other outcomes that can be affected by the presence of foreign affiliates. First, I look at the changes in the number of flows between 2013 and 2016 within a 4-digit HS product grouping, where a flow is defined as an exporter-product-destination combination. As visible in the top panel of Table 6, I find a positive and statistically significant relationship between the change in the foreign affiliate presence in the input-supplying industries and the change in the number of trade flows. This finding is suggestive of availability of better inputs, supplied by foreign affiliates, being associated with increased ability of Russian firms to export.

Next, I consider explicitly the number of new flows, i.e., flows that were observed in 2016 but that did not exist in 2013. I find that an increase in foreign presence in the input-sourcing industries is associated with a larger number of new flows (see the middle panel of Table 6).

This is consistent with the possibility that Russian firms that become suppliers to foreign affiliates start exporting new products (perhaps the same products they supply to foreign affiliates) or start exporting their existing or new products to new destinations (perhaps to supply sister companies of the foreign affiliate they serve in Russia).

In the bottom panel of Table 6, I consider the average GDP per capita of the destination countries to which Russian exporters direct their sales. More precisely, I calculate the weighted average of the destination GDP per capita within a given 4-digit HS product grouping, where export shares are used as weights. The change in the weighted GDP per capita between 2013 and 2016 is the outcome variable. The results, presented in the bottom panel of Table 6, suggest that an increase in foreign presence in the downstream industries is associated with more exports being destined for higher income countries. This is in line with the possibility that experience of supplying foreign affiliates helps Russian firms break into the markets of more developed countries.

5 Conclusions

The results presented in this paper suggest that FDI inflows may facilitate upgrading of the export structure in the host country. In particular, I show that Russian firms experience an export quality improvement after an increase in foreign presence in their input-supplying industries. This result is confirmed for exports in all destinations and for FDI originating from OECD countries, as well as other non-OECD developed countries. This conclusion is consistent with the cross-country evidence in Harding and Javorcik (2012) showing that sectors targeted by investment promotion agencies in their efforts to attract FDI inflows experience an improvement in the export quality.

This finding suggests that careful targeting of investment promotion policy toward industries supplying export-oriented sectors may be used to boost the quality of products exported by domestic producers. However, this should not be interpreted as a suggestion

towards offering tax breaks or subsidies to foreign investors, as such policies are not effective at attracting foreign investors or worthwhile.[15] Rather there should be an engagement in investment promotion efforts aiming at reducing the costs of FDI by providing information on business conditions and helping foreign investors deal with bureaucratic procedures (UNCTAD, 2018; World Bank, 2018). Thus, the role of investment promotion agencies in facilitating inward FDI can be vital.

[15]For instance, Haskel et al. (2007) examine within-sector productivity spillovers associated with FDI using UK data and conclude that it is quite easy to overpay when extending fiscal incentives to foreign investors.

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Table 1: Baseline results

	(1)	(2)	(3)	(4)
			ΔlnUV	
ΔOwnFDI$_{t-1}$	0.116			0.167
	(0.132)			(0.132)
ΔUpFDI$_{t-1}$		0.980***		1.116***
		(0.204)		(0.250)
ΔDownFDI$_{t-1}$			0.500	-0.119
			(0.670)	(0.710)
Observations	9,862	9,862	9,862	9,862
R-squared	0.001	0.004	0.001	0.006
			$\Delta\hat{Q}$	
ΔOwnFDI$_{t-1}$	0.177			0.221
	(0.141)			(0.154)
ΔUpFDI$_{t-1}$		0.790*		0.930**
		(0.413)		(0.387)
ΔDownFDI$_{t-1}$			0.511	0.018
			(0.941)	(0.931)
Observations	9,961	9,961	9,961	9,961
R-squared	0.001	0.002	0.001	0.003

Notes: The sample includes only exports of local firms. Standard errors, clustered at industry level, are presented in parentheses. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 2: Results by exports to OECD countries and exports to other destinations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				ΔlnUV				
	Exports to non-OECD countries				Exports to OECD countries			
ΔOwnFDI$_{t-1}$	0.043			0.067	0.238**			0.348***
	(0.198)			(0.181)	(0.114)			(0.121)
ΔUpFDI$_{t-1}$		0.942***		1.180***		1.108***		1.272***
		(0.231)		(0.323)		(0.377)		(0.269)
ΔDownFDI$_{t-1}$			-0.187	-0.910			1.418	0.828
			(0.783)	(0.863)			(0.936)	(1.056)
Observations	6,064	6,064	6,064	6,064	3,798	3,798	3,798	3,798
R-squared	0.001	0.003	0.001	0.005	0.005	0.008	0.005	0.019
				$\Delta\hat{Q}$				
	Exports to non-OECD countries				Exports to OECD countries			
ΔOwnFDI$_{t-1}$	-0.051			-0.031	0.416**			0.504***
	(0.103)			(0.105)	(0.159)			(0.169)
ΔUpFDI$_{t-1}$		0.833**		0.961**		0.662		0.977**
		(0.374)		(0.445)		(0.596)		(0.400)
ΔDownFDI$_{t-1}$			0.020	-0.592			1.203	0.851
			(0.822)	(0.762)			(0.925)	(1.025)
Observations	6,122	6,122	6,122	6,122	3,839	3,839	3,839	3,839
R-squared	0.001	0.002	0.001	0.002	0.009	0.002	0.003	0.014

Notes: The sample includes only exports of local firms. Standard errors, clustered at industry level, are presented in parentheses. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 3: Results by exports to neighboring countries and exports to other destinations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				ΔlnUV				
	Exports to neighboring countries				Exports to other destinations			
ΔOwnFDI$_{t-1}$	-0.045			-0.018	0.214			0.283
	(0.124)			(0.124)	(0.168)			(0.173)
ΔUpFDI$_{t-1}$		0.699**		0.759**		1.173***		1.395***
		(0.288)		(0.337)		(0.324)		(0.379)
ΔDownFDI$_{t-1}$			0.060	-0.371			0.816	-0.01
			(0.806)	(0.749)			(0.777)	(0.915)
Observations	4,025	4,025	4,025	4,025	5,837	5,837	5,837	5,837
R-squared	0.001	0.004	0.001	0.004	0.003	0.005	0.001	0.01
				$\Delta\hat{Q}$				
	Exports to neighboring countries				Exports to other destinations			
ΔOwnFDI$_{t-1}$	-0.017			0.012	0.258			0.315
	(0.163)			(0.179)	(0.184)			(0.199)
ΔUpFDI$_{t-1}$		0.727		0.792		0.950*		1.126***
		(0.56)		(0.653)		(0.502)		(0.378)
ΔDownFDI$_{t-1}$			0.124	-0.319			0.912	0.261
			(1.026)	(1.043)			(0.823)	(0.816)
Observations	4,045	4,045	4,045	4,045	5,916	5,916	5,916	5,916
R-squared	0.001	0.003	0.001	0.003	0.003	0.002	0.001	0.006

Notes: The sample includes only exports of local firms. Standard errors, clustered at industry level, are presented in parentheses. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 4: Results by FDI originating in developed versus other countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			ΔlnUV				$\Delta\hat{Q}$	
ΔOwnFDI$_{t-1}$ developed	0.116			0.172	0.177			0.209
	(0.133)			(0.137)	(0.142)			(0.138)
ΔOwnFDI$_{t-1}$ other	0.020			0.046	0.248			0.213
	(0.178)			(0.209)	(0.285)			(0.287)
ΔUpFDI$_{t-1}$ developed		1.000***		1.225***		0.791*		0.846**
		(0.209)		(0.246)		(0.420)		(0.386)
ΔUpFDI$_{t-1}$ other		7.434		8.151		1.127		0.548
		(9.681)		(9.732)		(9.212)		(9.900)
ΔDownFDI$_{t-1}$ developed			0.568	-0.090			0.097	-0.212
			(0.708)	(0.756)			(1.033)	(1.011)
ΔDownFDI$_{t-1}$ other			-0.102	-1.975			4.196	2.572
			(1.772)	(1.896)			(3.453)	(3.247)
Observations	9,862	9,862	9,862	9,862	9,961	9,961	9,961	9,961
R-squared	0.001	0.005	0.001	0.007	0.001	0.002	0.001	0.004
ΔUpFDI$_{t-1}$ developed = ΔUpFDI$_{t-1}$ other								
F-stat		0.446		0.508		0.001		0.001
p-value		0.507		0.479		0.971		0.976

Notes: The sample includes only exports of local firms. Standard errors, clustered at industry level, are presented in parentheses. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 5: Results including industry concentration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			ΔlnUV				$\Delta\hat{Q}$	
HHI_{2012}	0.001	-0.001	0.001	-0.001	0.001	0.001	0.002	0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
$\Delta OwnFDI_{t-1}$	0.149			0.278*	0.171			0.295
	(0.172)			(0.159)	(0.174)			(0.185)
$\Delta OwnFDI_{t-1} \times HHI_{2012}$	-0.005			-0.013	0.001			-0.009
	(0.010)			(0.009)	(0.010)			(0.010)
$\Delta UpFDI_{t-1}$		1.249***		1.695***		0.876		1.337**
		(0.287)		(0.435)		(0.559)		(0.622)
$\Delta UpFDI_{t-1} \times HHI_{2012}$		-0.025		-0.033		-0.007		-0.008
		(0.020)		(0.024)		(0.035)		(0.035)
$\Delta DownFDI_{t-1}$			0.009	-1.583			-0.695	-2.096
			(1.040)	(1.234)			(1.739)	(1.544)
$\Delta DownFDI_{t-1} \times HHI_{2012}$			0.040	0.098			0.098	0.154**
			(0.053)	(0.062)			(0.074)	(0.069)
Observations	9,862	9,862	9,862	9,862	9,961	9,961	9,961	9,961
R-squared	0.001	0.005	0.001	0.009	0.001	0.002	0.001	0.006

Notes: The sample includes only exports of local firms. Standard errors, clustered at industry level, are presented in parentheses. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 6: Results for other outcomes

	(1)	(2)	(3)	(4)
		Δln(N of flows)		
ΔOwnFDI$_{t-1}$	-0.333***			-0.174
	(0.118)			(0.123)
ΔUpFDI$_{t-1}$		1.641***		1.541***
		(0.321)		(0.346)
ΔDownFDI$_{t-1}$			0.417	-0.094
			(0.562)	(0.587)
Observations	1,522	1,522	1,522	1,522
R-squared	0.005	0.020	0.001	0.022
		ln(N of new flows)		
ΔOwnFDI$_{t-1}$	0.029			-0.179
	(0.416)			(0.421)
ΔUpFDI$_{t-1}$		-0.896		-1.843
		(1.482)		(1.582)
ΔDownFDI$_{t-1}$			7.501***	8.110***
			(1.934)	(2.087)
Observations	1,551	1,551	1,551	1,551
R-squared	0.001	0.001	0.010	0.011
		Δ ln(Avg. Dest. GDP p.c.)		
ΔOwnFDI$_{t-1}$	0.136			0.111
	(0.208)			(0.213)
ΔUpFDI$_{t-1}$		-0.101		-0.220
		(0.627)		(0.664)
ΔDownFDI$_{t-1}$			1.732*	1.803*
			(0.941)	(0.984)
Observations	1,522	1,522	1,522	1,522
R-squared	0.001	0.001	0.002	0.003

Notes: The sample includes only exports of local firms. Standard errors, clustered at industry level, are presented in parentheses. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Figure 1: Unit values vs. the alternative quality measure

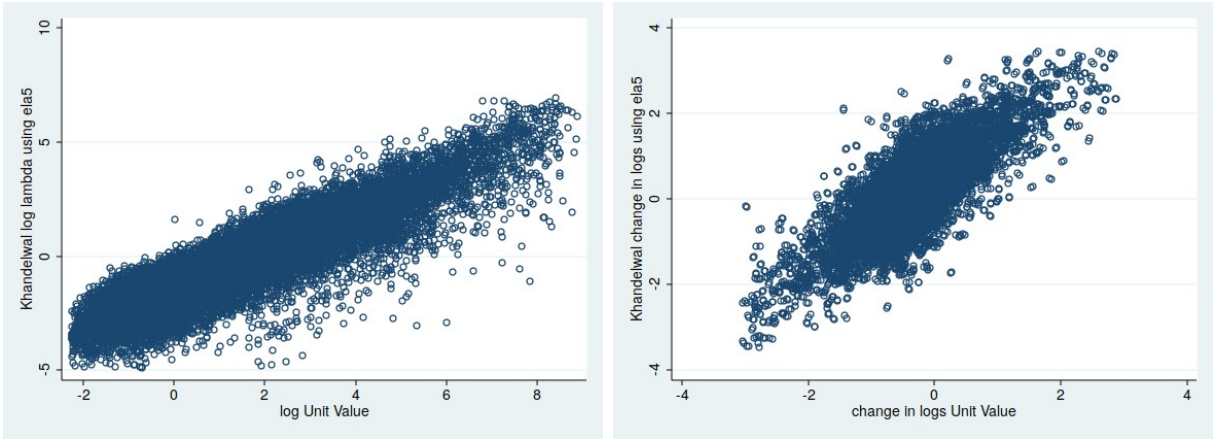
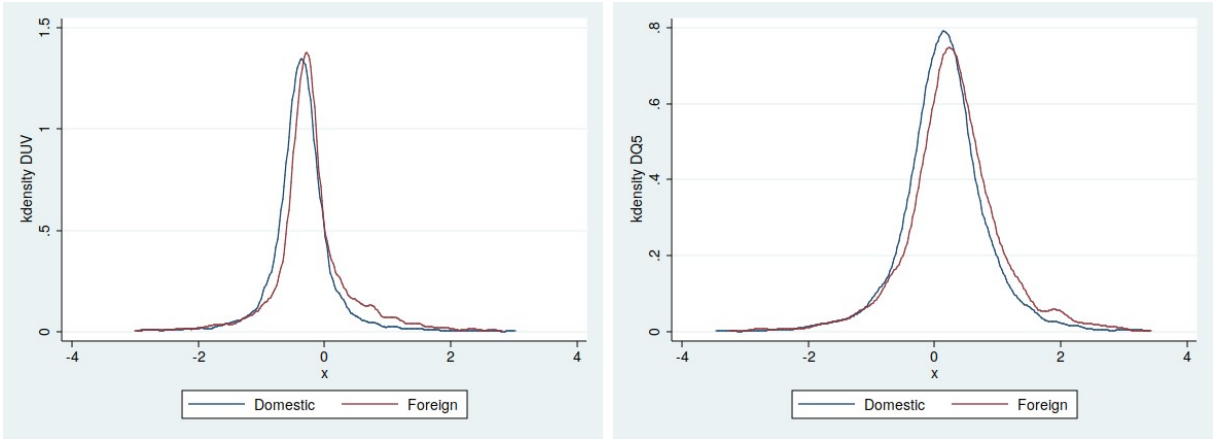


Figure 2: Distribution of unit values and quality among domestic and foreign exporters



Appendix A Additional tables

Table A1: Top 20 and bottom 20 products based on changes in unit values

Code	Name	$\bar{x}_w \Delta$UV
8539219200	Glow lamps halogen with tungsten thread on tension more than 100 in	2.24
7224901800	Semi-finished products from other alloy steels, rectangular cross-section, forged	1.87
2804300000	Nitrogen	1.76
2834294000	Other nitrates of copper	1.70
8708505509	Bridges leading with differential assembled or separately from other elements of transmission and bridges not leading; their parts, stamped of steel, other	1.66
6406101000	Preparations of top of footwear and their detail, except for backs and rigid internal and intermediate details from skin	1.43
3912201900	Other nitrate celluloses (including collodions) unplasticized	1.42
2827392000	Iron chlorides others	1.38
6203391100	Jackets and blazer production and professional, men's or for boys from artificial threads	1.36
2907220000	Hydrochinone and its salts	1.24
9018199000	The other equipment electrodiagnostic (incl. equip. for functional diagnostic testings)	1.23
2930909900	Connections organosulfur: others	1.23
8907100000	Rafts are inflatable	1.2
8467920000	Parts of pneumatic tools	1.19
7311001100	Tanks for the compressed or liquefied gas, from ferrous metals, seamless, designed for pressure of 165 bars or more, with a capacity less than 20l.	1.05
8532220000	Condensers of constant capacity aluminum electrolytic	1.04
2912410000	Vanillin (4-hydroxy-3-metoksibenzaldegid)	1.01
7318230009	Products without carving, rivets other	1.01
8483405900	Other variable speed gears including hydrotransformers	0.99
8512309009	Chime devices, other	0.90
Code	Name	$\bar{x}_w \Delta$UV
3910000002	Silicon resins in primary forms, other	-2.37
2846100000	Compounds of cerium	-1.92
4802568000	Paper and cardboard uncoated, used for press weight 1sq.m 40g or more, but no more than 150g	-1.89
8423821000	Control units of weight and device control automatic with maximum weight of weighing more than 30kg, but less than 5000kg working at achievement of previously set weight	-1.86
6805100000	Natural or artificial abrasive powder or grain only on the woven textile basis cut or sewed	-1.81
3702430000	The film is other, nonperforated more than 610 mm wide and no more than 200 m long	-1.67
5310900000	Other fabrics from jute or bast fibers classified in commodity position 5303 excluding unbleached	-1.64
2827398500	Chlorides other	-1.39
1704905100	Pastes and masses, including marzipan, in primary packings net - weighing 1 kg or more, not containing some cocoa	-1.38
6207290000	Nightgowns and pajamas men's or for boys from other textile materials	-1.27
6201131000	Coat, short coat, capes, raincoats and similar products, men's or for boys, except products of commodity position 6203, from man-made yarns, weighing one product less than 1kg	-1.25
7013990000	Glassware are others	-1.23
7508100000	Fabric, lattices, and grids from nickel wire	-1.23
9607209000	Other parts of fasteners of "lightnings"	-1.22
8510900000	Parts of electrorazors, machines for hairstyle and depilation with built-in to electric motors	-1.21
6305900000	Bags and packages packaging of other textile materials	-1.19
7306699009	Welded other pipes, not round cross-section,	-1.15
8542323900	Schemes are electronic integral, memory devices, dynamic operational memory devices (dose): with memory size more than 512 Mbit	-1.13
3909200000	Melamine resins, in primary forms	-1.08
5209310000	The cottons containing on weight not less than 85 and of cotton, painted, calico weave, with area density more than 200 g/m2	-1.07

Note: Weighted Average: $(\Delta \log(UV) \times w)/w$; share in product exports: $w = UV/UV_p$

Table A2: Top 5 sectors in terms of FDI presence

Sector	OwnFDI	Sector	ΔOwnFDI
Tobacco products	0.97	Flour and cereals	0.18
Pulp, wood pulp, paper and cardboard	0.73	Other electrical equipment	0.13
Household appliances not incl. in other groups	0.68	Pharmaceutical products	0.10
Fruits and vegetables	0.68	Furniture	0.10
Soap, cleaning, perfumery and cosmetics	0.64	Machine tools	0.10
Sector	DownFDI	Sector	ΔDownFDI
Wooden containers	0.30	Veneer sheets, plywood, slabs, panels	0.03
Flour and cereals	0.28	Glass and glass products	0.02
Glass and glass products	0.26	Rubber products	0.02
Paper and paperboard products	0.24	Textile	0.01
Artificial and synthetic fibers	0.24	Castings	0.01
Sector	UpFDI	Sector	ΔUpFDI
Cast iron and steel pipes	0.20	Petroleum products	0.00
Polygraphic activity	0.20	Meat and meat products	0.00
Other primary processing of iron and steel	0.16	Insulated wires and cables	0.00
Metal structures and its parts	0.15	Clothes and accessories	0.00
Products by a method of powder metallurgy	0.14	Wholesale trade (except vehicles)	-0.01

Table A3: Baseline results based on domestic and foreign exporters

	(1)	(2)	(3)	(4)
			ΔlnUV	
ΔOwnFDI$_{t-1}$	0.142			0.201
	(0.150)			(0.137)
ΔUpFDI$_{t-1}$		0.862**		1.450***
		(0.371)		(0.430)
ΔDownFDI$_{t-1}$			-1.205	-1.977
			(1.377)	(1.335)
Observations	13,683	13,683	13,683	13,683
R-squared	0.001	0.003	0.002	0.010
			$\Delta\hat{Q}$	
ΔOwnFDI$_{t-1}$	0.176			0.221
	(0.204)			(0.196)
ΔUpFDI$_{t-1}$		0.550		1.079*
		(0.558)		(0.588)
ΔDownFDI$_{t-1}$			-1.048	-1.628
			(1.751)	(1.772)
Observations	13,813	13,813	13,813	13,813
R-squared	0.001	0.001	0.001	0.004

Note: The sample includes only exports of local firms. Standard errors, clustered at industry level, are presented in parentheses. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.