Indirect Trade and Direct Trade:
Evidence from Japanese firm transaction data

ITO Tadashi
Gakushuin University

SAITO Yukiko Umeno
RIETI

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Research Institute of Economy, Trade & Industry, IAA

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ITO Tadashi ♣

Gakushuin University

SAITO Yukiko Umeno ♠

Waseda University and Research Institute of Economy, Trade and Industry

Abstract

This paper attempts to establish stylized facts on direct and indirect trade and its impact on firm performance using firm transaction data of Japanese firms, with the special goal of shedding light on regional aspects and indirect exports/imports. The major findings are: 1) firms in regional areas are smaller in size than those in metropolitan areas, and firms in regional areas are less likely to participate in export or import, even after controlling for firm size; 2) direct and indirect exports and imports in terms of the number of firms, employees, sales values, and value-added represent 40%-70% of the regional economies; 3) indirect exporters in regional areas are likely to become direct exporters, which suggests the effects of learning in terms of procedures for conducting exporting, searching for customers, and gaining information on foreign markets, which is not the case for indirect importers; and 4) both newly started direct export/import firms and newly started indirect export/import firms tend to grow faster. In addition, the size of expansion is greater for direct export/import firms than for indirect ones, and is greater for firms in regional areas compared to metropolitan areas.

Keywords: Wholesalers, Regional economies, Indirect exports, Indirect imports
JEL classification: R10, F10

1. INTRODUCTION

By exporting goods or services, firms not only expand their markets but also benefit from acquiring new knowledge and techniques, thus raising their productivity.[1] Imports, on the other hand, give firms the chance to procure better inputs in terms of lower prices and/or higher quality, thus enabling more efficient production.[2] As the costs of transportation and transactions steadily decrease, interfirm transaction networks expand on a global scale, and worldwide production system and global value chains (GVCs) emerge.

Since Ricardo (1817), the international trade literature has long investigated the merits of trade. A recent development, the so-called "heterogeneous firms trade model" pioneered by Melitz (2003) and Eaton and Kortum (2002) shows that for domestic firms, trade liberalization favors only the most productive firms because it allows them to enter foreign markets. In contrast, the least productive firms are forced to exit the market because of tough competition with more foreign competitors. However, there are firms in the middle of these two groups of firms, which benefit from indirectly participating in GVCs in exporting their goods or importing inputs through wholesalers or other manufacturing firms.

Helpman, Melitz and Yeaple (2004) argue that because foreign direct investment (FDI) or exports incurs fixed costs relevant to each mode, firms need to be sufficiently productive to absorb the FDI fixed cost or export fixed costs to engage in these modes. Usually, FDI fixed costs are larger than export fixed costs. As a result, only the most productive firms, having lower marginal costs, can serve foreign markets through FDI. The next most productive firms serve foreign markets by exporting goods produced in their own countries and the least productive firms sell their products only in their domestic markets. Bernard et al. (2010), Ahn et al. (2011), Crozet et al. (2013) and Akerman (2016) incorporate indirect exports into this framework. Namely, although some firms are not sufficiently productive to serve foreign markets, they can export their products through intermediaries, which reduce export-related fixed costs by spreading the fixed costs among many export clients. Thus, many small and medium sized firms can enjoy benefits of trade. Firms in regional economies, especially, are smaller and less productive and thus less likely to directly export their goods. However, there is a larger scope for firms in regional economies to benefit from indirect exporting.

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[1] Harris and Li (2007), Crespi et al. (2008), De Locker (2013), Shevtsova (2015), Bai et al. (2017), among others, show productivity enhancing effects of exports.

[2] Amiti and Konings (2007) shows the positive impacts of imported inputs for firms' productivity. Antras and Helpman (2004) and Antràs, Fort and Tintelnot (2014) provide theoretical models on outsourcing. Merits pertaining outsourcing in domestic firm transactions are shown by Bernard, Moxnes and Saito (2016).

This paper attempts to establish stylized facts on direct and indirect trade and its impact on firm performance using firm transaction data of Japanese firms.[3] The main findings are:

1. The size of firms, in terms of the number of employees and sales values, is smaller in regional areas than in metropolitan areas[4]. Even controlling for firm size, firms in regional areas are less likely to export, which indicates higher trade costs in regional economies. This is probably due to regional economies having less information on overseas markets lacking sufficient infrastructures for export activities.

2. Approximately 40 percent of firms in regional areas are engaged in either direct or indirect exports and direct or indirect imports. This share rises to close to 70 percent in terms of the number of employees, sales values, and value-added.

3. Indirect exporters are likely to become direct exporters in regional areas, which suggests that there are the learning effects of export procedures, customer searches and gaining information on foreign market, which is not the case for indirect importers.

4. Both newly starting direct export/import firms and newly starting indirect export/import firms tend to grow faster. The size of this effect is larger for direct export/importers than indirect ones and the magnitude is larger for firms in the regional areas than in metropolitan areas.

2. METHODOLOGY

2.1. *Data*

We use firm-level transaction data among firms compiled by Tokyo Shoko Research (TSR) Limited, a private company, records data on both listed and non-listed companies in Japan. The main information in the dataset includes transaction data of both sales and purchase between firms and several facts about each firm, including the year of establishment, paid-up capital, total sales value and number of employees. The dataset covers approximately 1.4 million firms and about 8 million transactions between them for each year. The data are updated whenever the survey is done for firms. As the survey of each firm is not done at the same time, updates are done throughout the years. We used the data from the year 2012 to the year 2016, and only those that had been updated during this period. For each firm, 24 transactions at maximum are recorded. There should be firms that have more than 24 transaction partners. We

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[3] Similar analyses using the same data set with this paper have been completed by Fujii, Ono and Saito (2017), which finds that the distributions of sales and labor productivity are ordered for direct, indirect, and non-exporters, and also by Okubo, Ono, Saito (2015), which finds that wholesalers tend to locate closer to their manufacturing buyers and farther from their manufacturing sellers.

[4] The metropolitan area is called the "core" region, whereas the regional area is called "periphery" region.

capture those cases by combining the reporters' transaction reports with those of the partners'. For example, those firms that are reported as partner firms by many reporting firms, such as Toyota, have more than 24 transactions.

To determine how representative the TSR dataset is, we compared it with the Economic Census for Business Activity. The TSR data covers approximately 60 percent of the Census data. Figure 1 shows firm distribution by the number of employees in the TSR dataset and the Economic Census for Business Activity. The number of firms with fewer than five employees in the TSR data is smaller than that in the Census data. In terms of regional distribution, a focus of this paper, there are fewer firms in the TSR than in the Census in prefectures in the metropolitan areas, but the difference is not substantial (see Figure 2).

2.2. *Definition of indirect trade*

The TSR data include information on exports and imports in addition to the firm-to-firm transaction data. We focus our analyses on the manufacturing sector. When a manufacturer' export (import) status is recorded as "yes", we designate the firm as having direct exports (imports). When a manufacturer' answer is "no exports (imports)" but it sells products to wholesalers that have export (imports) status, we define the firm as having *indirect* exports (imports) through wholesalers. When a manufacturer' answer is "no exports (imports)" but the manufacturer sells its products to other manufacturers that have export (import) status, we define it as having indirect exports (imports) through other manufacturers. In summary, export (import) status is classified into the following four types.

a) direct exports

b) indirect exports through wholesalers

c) indirect exports through other manufacturers

d) domestic transactions only

These categories are mutually exclusive, i.e., each firm is classified into only one of the above categories. Admittedly, this is not a perfect definition of indirect exports. It overestimates the true number of indirect exports in which wholesalers and/or other manufacturers just act as intermediaries. However, given the available information, this is the best solution and it is a method used by other researchers.

Out of approximately 140 thousand manufacturing firms, for exports, 4.8 % of firms are classified as type a), 14.6 % as type b), 24.4 % as type c) and 56.1 % as type d). For imports, the share is 5.7 %, 22.3 %, 10.3 %, 61.3 %, respectively. The result shows for exports, that the indirect exports through other manufacturers are larger than the indirect exports through wholesalers, whereas the opposite is the case for imports.

3. ANALYSES

3.1. *Direct exporters/importers by industry and prefecture*

Figure 3 shows the percentage of firms in each industry that are exporters or importers. The larger fractions are exporters/importers in the manufacturing and wholesale industries, the industries focused on in this paper. In terms of geographical distribution, we observe higher proportions in metropolitan areas, such as Tokyo, Kanagawa, Aichi, Osaka, and Hyogo (see Figure 4). As TSR data is the information at firm level, not at establishment level, geographic location is based on the headquarters' location.

As is seen in Figure 4, analyses of 47 prefectures include too much information and thus preclude us from obtaining clear empirical regularities. Moreover, we can also see in Figure 4 that a large difference lies between the mega cities and the other regions. Because of these reasons, in subsequent analyses, locations are categorized into what this paper calls the "core" and "periphery" regions.[5] We group Saitama, Chiba, Tokyo, Kanagawa, Aichi, Kyoto, Osaka and Hyogo as "core" regions, whereas the remaining prefectures are "periphery" regions. With this aggregation into "core" and "periphery", Figure 4 becomes Figure 5. Both exports and imports of manufacturing and wholesale industries are higher in the "core" regions, and especially in wholesale industry. It can also be noted that there is a substantial cross-industry variation in exporter/importer shares (as shown in Figure 6). In the estimation analyses below, we control industry characteristics by including the industry fixed effects.[6]

3.2. *Direct exporters/importers by firm size and core/periphery*

We have seen in Section 3.1. that exporter/importer ratios are different between the core and the periphery. This sub-section investigates whether this difference comes from possible geographical factors or from other firm characteristics in each (core or periphery) region. Figure 7, Figure 8 and Figure 9, respectively, show the distribution of firms by three measures of firm size, namely, number of employees, sales value, and sales value per employee. A firm located in a core region tends to have a larger number of employees, a larger sales value, and a larger sales value per employee. This finding suggests that firms in the periphery are small and thus, cannot afford to bear export-related costs.

To control for differences arising from firm size, Figure 10 shows the proportion of exporters/importers by the number of employees in the core and periphery regions in the

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[5] As is mentioned below, the core regions are close to major infrastructures, such as ports, airports.

[6] There might be something specific for some industries, such as the automobile industry, but that potential industry-specific effect is controlled by industry dummy.

manufacturing sector. The larger the firm size, the higher the proportion of firms that are exporters/importers. Namely, size matters. The location also matters. For the same firm size category, the proportion of firms in the core region is higher both for exports and imports. Notably, as shown in Figure 11, the locational advantage of the core region is even more outstanding for wholesale firms. A firm with only one employee in the core region is more likely to be an exporter/importer than a firm with more than 128 employees in the periphery region. This suggests a strong locational advantage of the core region for wholesalers. The same empirical regularity is found with other measures of firm sizes, i.e., sales value and sales value per employee, as is evidenced in Figure 12, Figure 13, Figure 14, and Figure 15. To verify the descriptive analyses, econometric estimations using probit model are displayed in Table 1 and Table 2. The coefficient estimates for "core" (the core region dummy) are statistically significant at a 0.1 percent significance level with positive signs, and the magnitude is higher for wholesale firms. The number of employees and the sales value per employee also show positive and highly statistically significant coefficients.

3.3. *Indirect exports/imports: Overview of the magnitude in the economy*

This sub-section studies the magnitude of indirect exports/imports on the regional economy. As is argued in Section 2.2, a sizable proportion of firms, more precisely, 39 percent of manufacturing firms, are engaged in indirect exports either through other manufacturers or through wholesalers. Figure 16 and Figure 17 respectively show the share of direct and indirect exports and the share of direct and indirect imports, respectively. In terms of the number of firms (n_firm), close to 40 percent of firms are engaged in either direct exports (imports) or indirect exports (imports) in the periphery regions. In terms of the number of employees (emp), sales value (sales) and value-added (va), the shares of direct and indirect exports (imports) reach more than 70 percent. This finding indicates a large impact of direct and indirect exports (imports) on regional economies.

4. THE NEXUS BETWEEN INDIRECT AND DIRECT EXPORTS/IMPORTS

Having seen in Section 3 that direct and indirect exports (imports) have a sizable impact on the economy, some relevant questions are 1) whether indirect exporters/importers become direct exporters/importers and 2) whether there is a nexus between direct/indirect exports/imports and firm performance. This section attempts to answer to these two research questions.

4.1. *Do indirect exporters/importers become direct exporters/importers?*

This sub-section investigates whether indirect exporters/importers become direct exporters/importers, presumably through learning trade procedures and obtaining information on overseas markets in the process of indirect exports/imports. In the theoretical frameworks mentioned above, in changing from indirect exports to direct exports, a firm becomes more productive and thus earns more, which in turn increases the national welfare. We estimate the following equation by using a panel linear probability model as follows.[7]

$$d\_start\_export_{i,t} = \alpha * d_{indirect\,i,t-1} + \delta * X_{i,t-1} + u_i + u_t + \varepsilon_{it}$$

where $d\_start\_export_{i,t}$ is the dummy variable that takes the value 1 if firm i directly exports its goods in the year t, otherwise 0, $d\_indirect_{i,t-1}$ takes 1 if the firm indirectly exports its goods in the previous year, and $X_{i,t-1}$ is a vector of control variables, such as the natural logarithms (hereinafter, log) of sales value, the log of the number of employees of the previous year. The term u_t is the year fixed effects and u_i *is* firm fixed effects. Estimations by core/periphery region are also done separately. ε_{it} is an i.i.d. error. The estimation results are in Table 3. As the coefficient estimates for the indirect export status in the previous year (d_indirect_export$_{t-1}$) show, indirect exporters tend to become direct exporters (Column 1 and 2). The variable "core" is a dummy variable, which takes 1 if the firm is located in the core region, otherwise, 0. When the sample is divided into the periphery (Column 3) and the core (Column 4), the statistical significance is observed only in the periphery. The log of sales (lnsales) shows the expected positive sign with high statistical significance. For Column 5 to 8 and Column 9 to 12, the log of the number of employees and the log of sales per employee are used, respectively, as the control variable for firm size. The results are very similar to those for Column 1 to 4. In Columns 13 to 16, direct import status in the previous year (d_import$_{t-1}$) and indirect import status in the previous year (d_indirect_import$_{t-1}$) are included. Direct importers (d_import$_{t-1}$) tend also to be direct exporters, whereas indirect export status in the previous year has no correlation with direct export status. The variable of the main interest (d_indirect_export$_{t-1}$) still show very similar results as the previous ones. The same patterns are observed when we include the log of sales value (Column 13 to 16), or the log of the number of employees (Column 17 to 20), or the log of sales per employee (Column 21 to 24) as control variables.

The same analyses are performed using direct imports as the dependent variable. Namely, the estimation equation is:

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[7] Given the computational burden of search process of probit/logit model, we employ a linear probability model. As a check, we performed probit model for some estimation equations and found the results showed almost no difference from linear probability model.

$$d\_start\_import_{i,t} = \alpha * d_{indirect_{i,t-1}} + \delta * X_{i,t-1} + u_i + u_t + \varepsilon_{it}$$

The estimation results are in Table 4. The coefficient estimate for indirect import status in the previous year (d_indirect_import$_{t-1}$) is consistently insignificant in all the estimations from Column 1 to Column 24. This contrasts with the case of exports shown above. We conjecture that finding alternative suppliers abroad incurs more costs than finding new customers abroad. Export status in the previous year (d_export$_{t-1}$) shows highly statistically significant positive signs. except in periphery areas. Indirect export status in the previous year (d_indirect_exports$_{t-1}$) is statistically insignificant.

Overall, this sub-section concludes that indirect exporters are likely to become direct exporters in periphery areas, but not in core areas and there is not a "cross-nexus" between indirect imports and direct exports or between indirect exports and direct imports.

4.2. *Direct (indirect) exports (imports) and firm performance*

The sub-section explores the nexus between direct (indirect) exports (imports) status and firm performance. We estimate the following equation.

$$Firm\ performance\ \ _{i,t} = \alpha * d\_direct_{i,t} + \beta * d\_indirect_{i,t} + \delta * X_{i,t} + \varepsilon_{it}$$

For the dependent variable, firm performance, we use 1) the sales value, 2) the number of employees, and 3) the sales value per employee, for which the values in logarithms are used for estimations. The subscripts of i and t represent firm and year, respectively. The variables d_direct$_{i,t}$ is the dummy for direct export/import status in year t and d_indirect$_{i,t}$ is the dummy for indirect exports/imports status in year t. X$_{i,t}$ is the vector of control variables, such as year fixed effects, firm fixed effects and industry fixed effects. The estimation results for sales value are shown in Table 5. All the coefficient estimates of direct/indirect exports/imports are positive with high statistical significance, indicating that direct/indirect exports/imports starting firms tend to grow faster. The direct export/import starting status has a larger coefficient than indirect export/import starting status. The coefficient estimates for the periphery areas are slightly larger than those for core areas. The estimation results for the number of employees are summarized in Table 6. Here, also, all the coefficient estimates of direct/indirect exports/imports are positive with high statistical significance, indicating that newly started direct/indirect export/import firms tend to grow faster. In terms of the difference between the core and the periphery areas, it is opposite to the case of sales value (see Table 5), and the coefficient estimates for the periphery are smaller than those for the core. Finally, Table 7 shows the estimation results for sales per employee. The results are very similar to those of Table 5 and Table 6 and as we can expect, from the above results in Table 5 and Table 6, that the coefficients for the periphery are larger than those for the core.

5. CONCLUDING REMARKS AND DISCUSSION

This paper establishes stylized facts on the direct and indirect trade and its impact on firm performance using firm transaction data of Japanese firms, especially shedding light on regional aspects and indirect exports/imports. The major findings are: 1) firms in regional areas are smaller in size than those in metropolitan areas, and firms in regional areas are less likely to export/import, even after controlling for firm size; 2) direct and indirect exports or imports based on number of firms, employees, and sales values, represent 40 to 70 percent of the regional economies; 3) indirect exporters in a regional area are likely to become direct exporters, which suggests that firms learn export procedures, discover how to find customers, gain information on foreign markets, which is not the case for indirect importers; and 4) using the sales value and the sales value per employee as firm performance measures, both newly starting direct export/import firms and newly starting indirect export/import starting firms tend to grow faster, however, and the size of the growth is larger for direct export/import firms than for indirect ones and is larger for firms in regional areas than in metropolitan areas.

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Tables and Figures

Figure 1: Firm distribution by the number of employees, the TSR dataset and the census
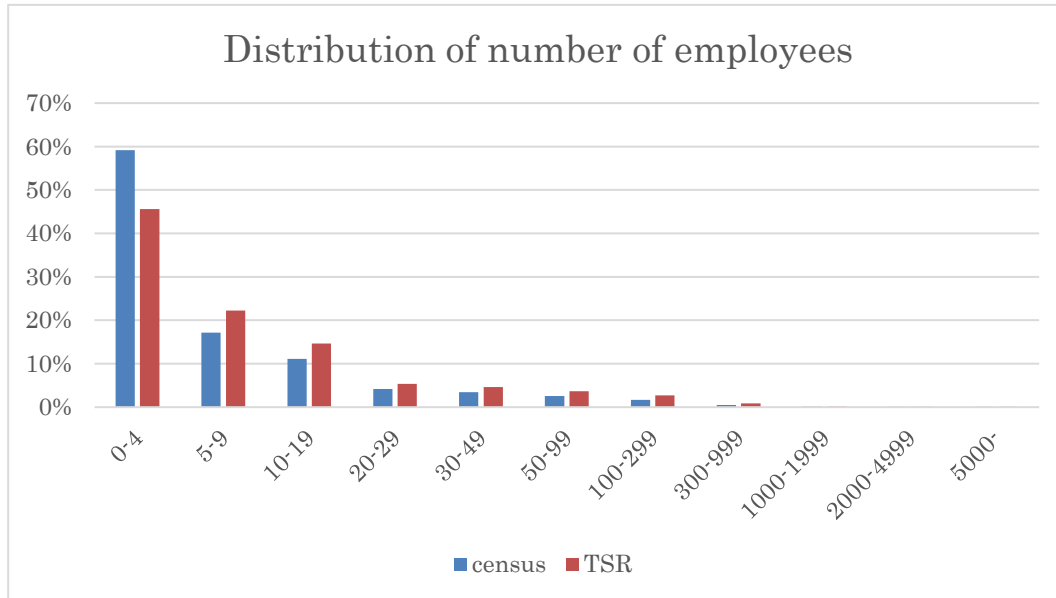
Source: Authors' computation from the TSR and the Census

Figure 2: Firm distribution by prefectures, the TSR dataset and the census
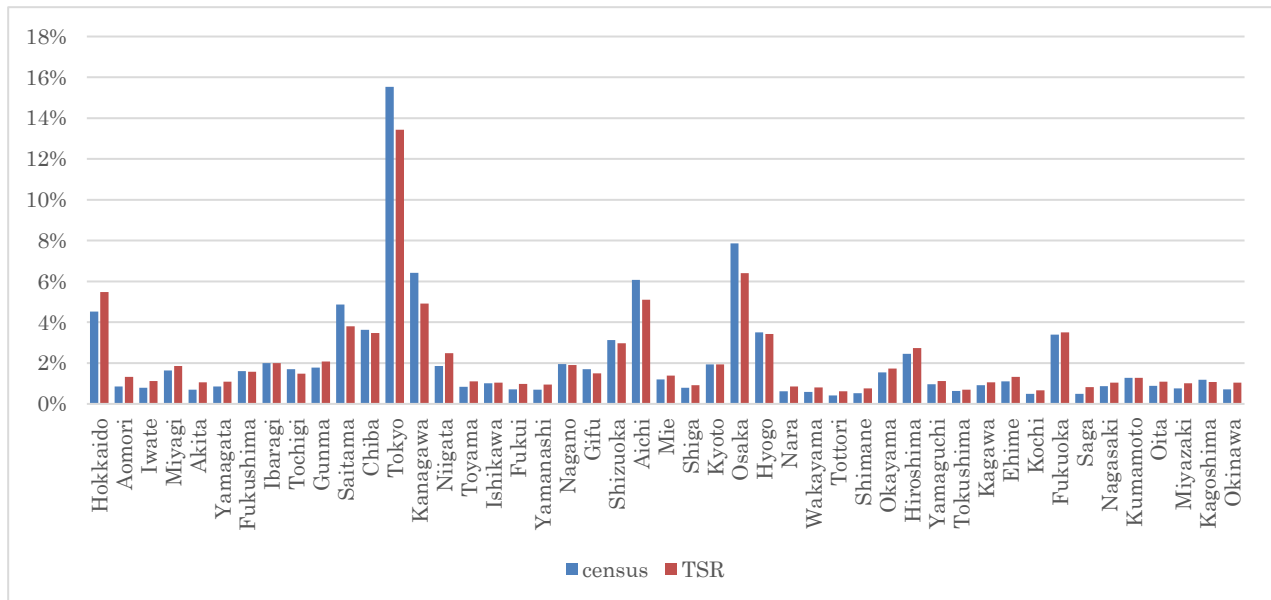
Source: Authors' computation from the TSR and the Census

Figure 3: Proportion of exporters and importers by industrial sector
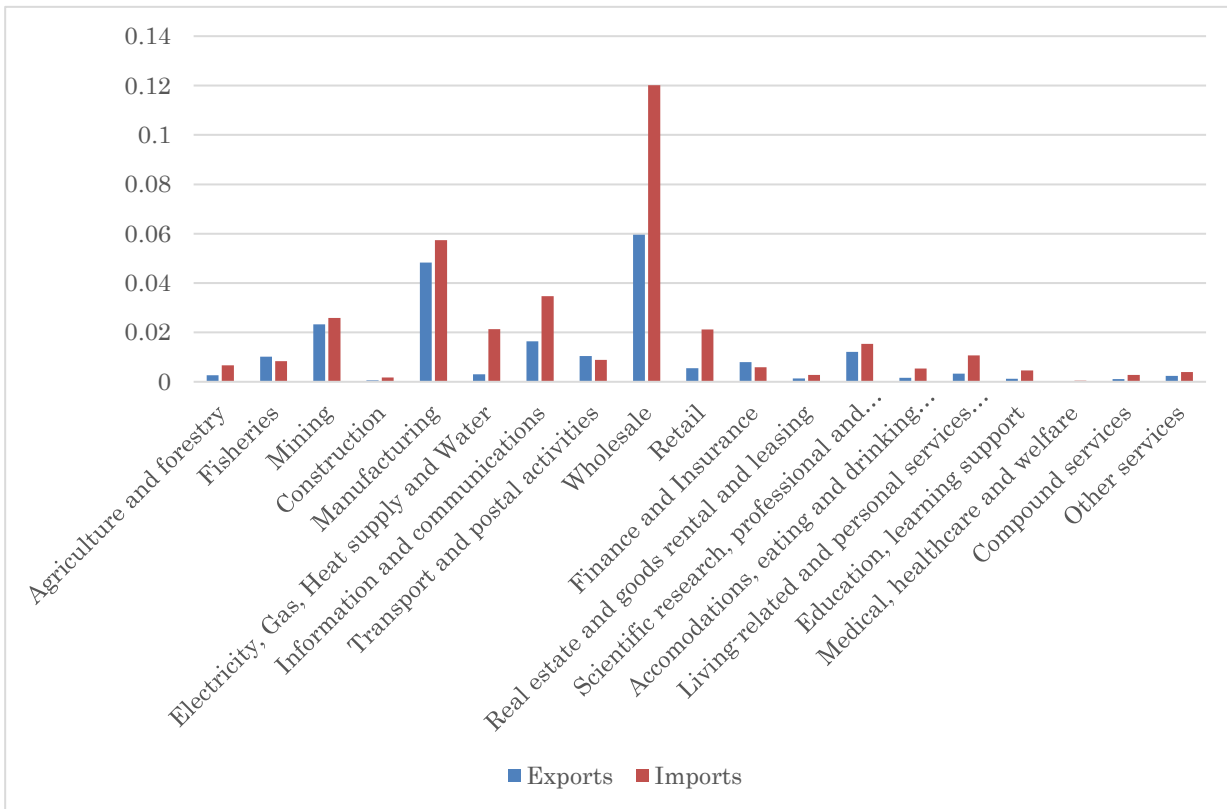
Source: Authors' computation from the TSR

Figure 4: Proportion of exporters and importers by prefecture (manufacturers and wholesalers)
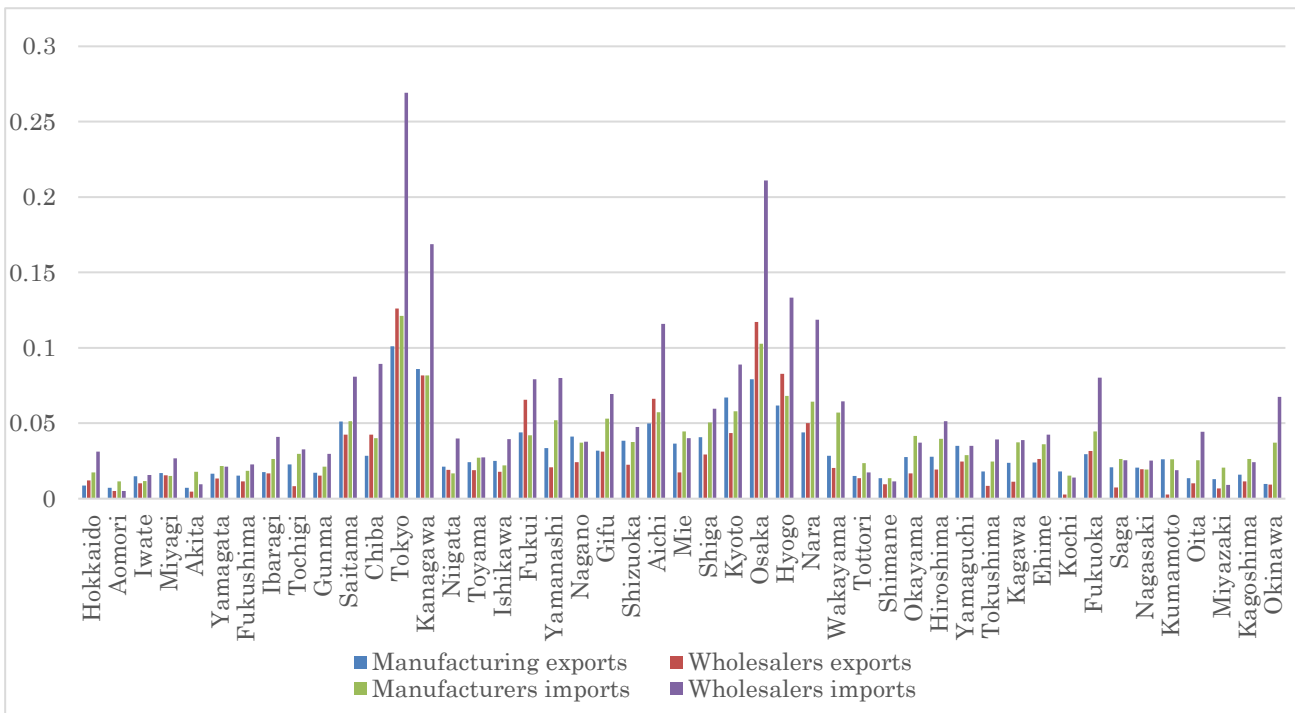
Source: Authors' computation from the TSR

Figure 5: Proportion of exporters and importers by core/periphery (manufacturers and wholesalers)
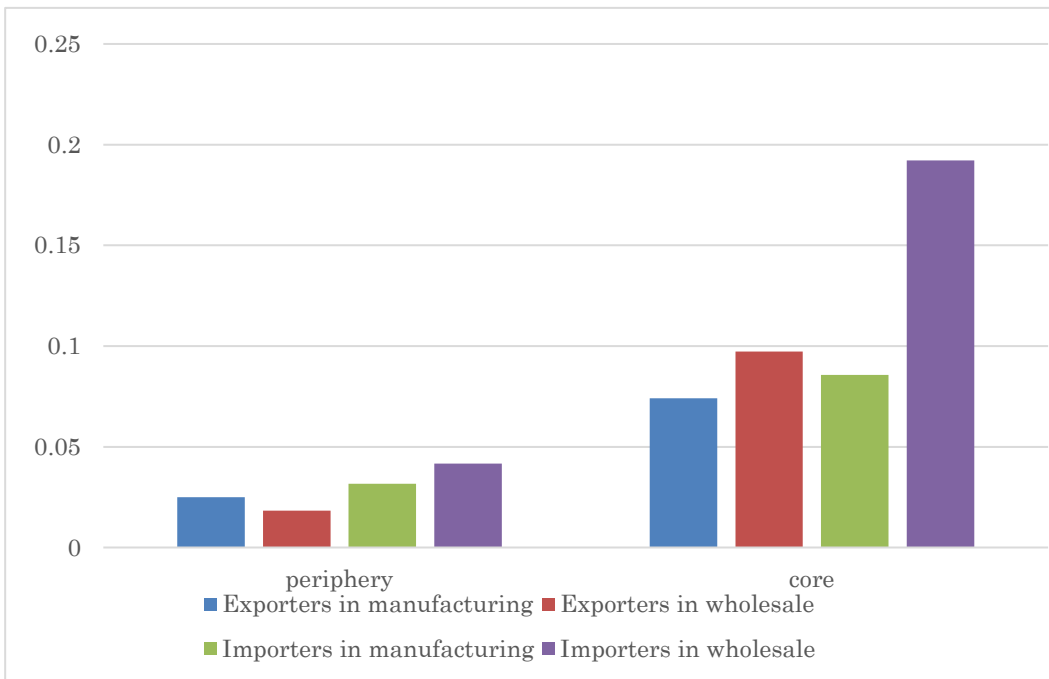
Source: Authors' computation from the TSR

Figure 6: Proportion of exporters and importers by core/periphery and industry (manufacturing)
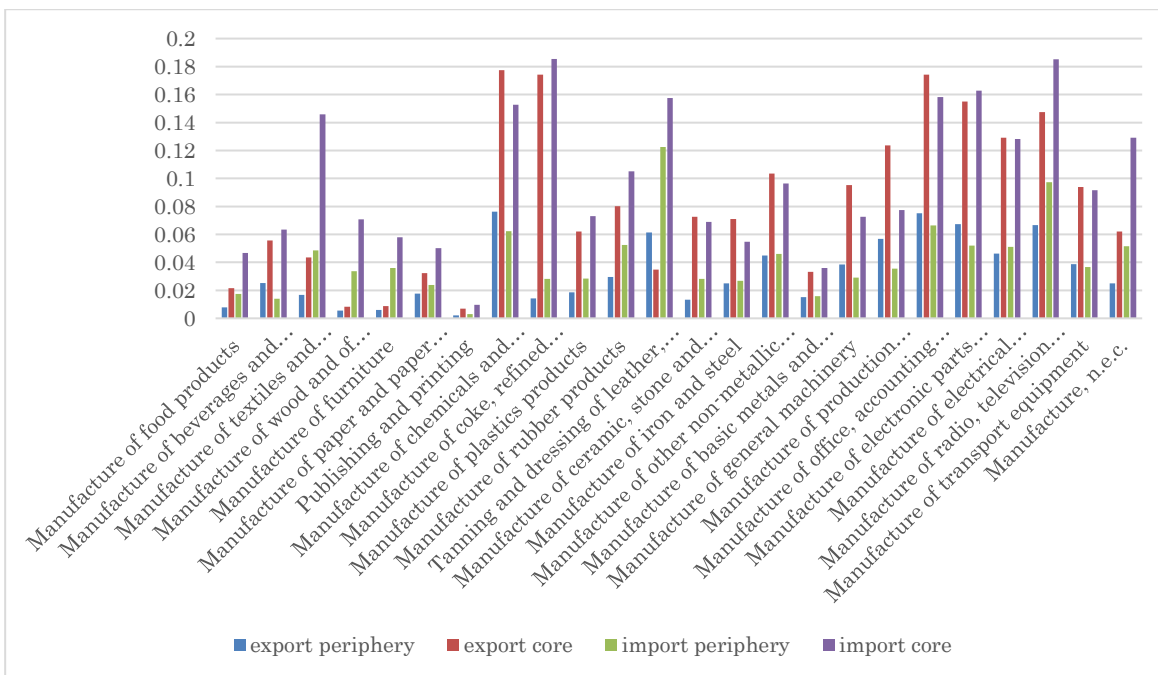
Source: Authors' computation from the TSR

Figure 7: Number of firms by firm size (number of employees), core and periphery
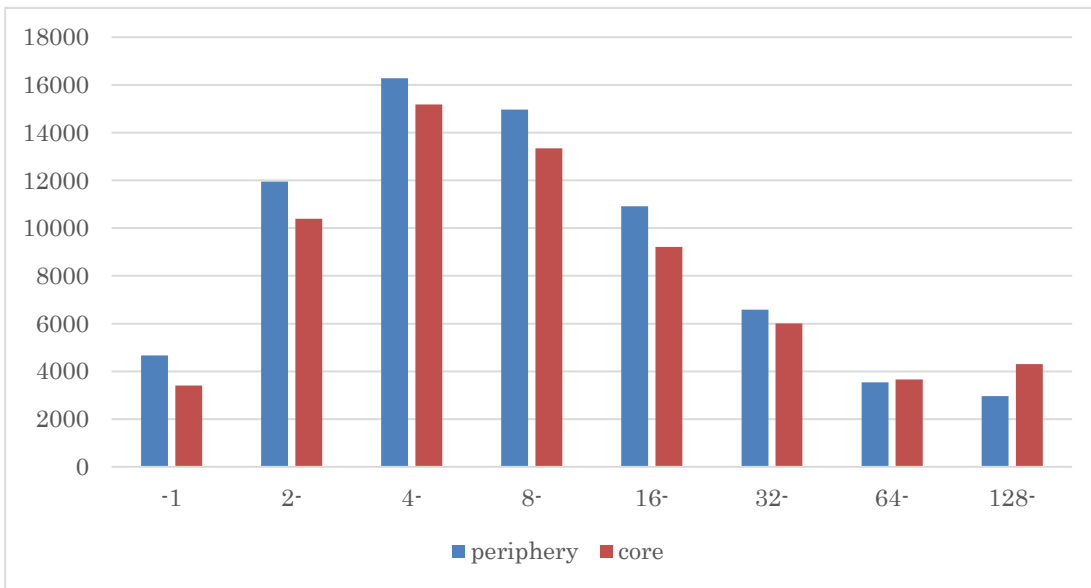
Source: Authors' computation from the TSR

Figure 8: Number of firms by firm size (sales value), core and periphery
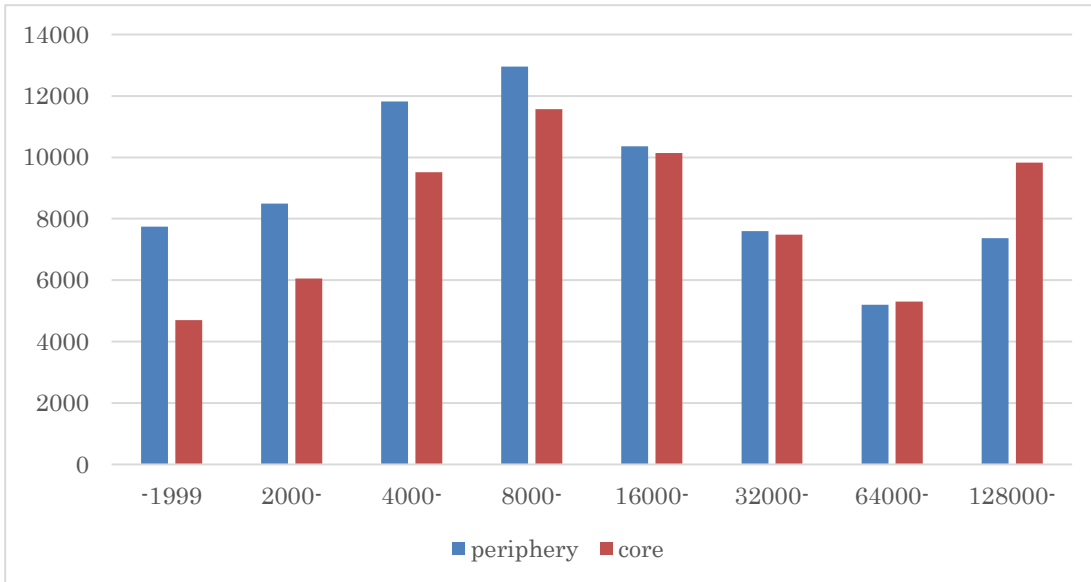
Source: Authors' computation from the TSR

Figure 9: Number of firms by firm size (sales value per employee), core and periphery
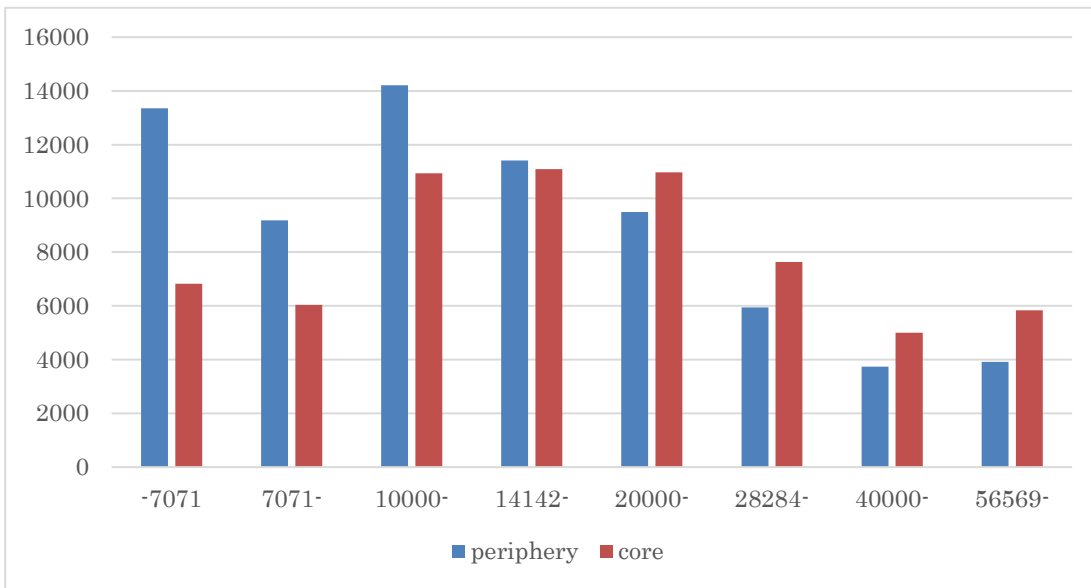
Source: Authors' computation from the TSR

Figure 10: Proportion of exporters and importers by firm size (number of employees), core/periphery, Manufacturing
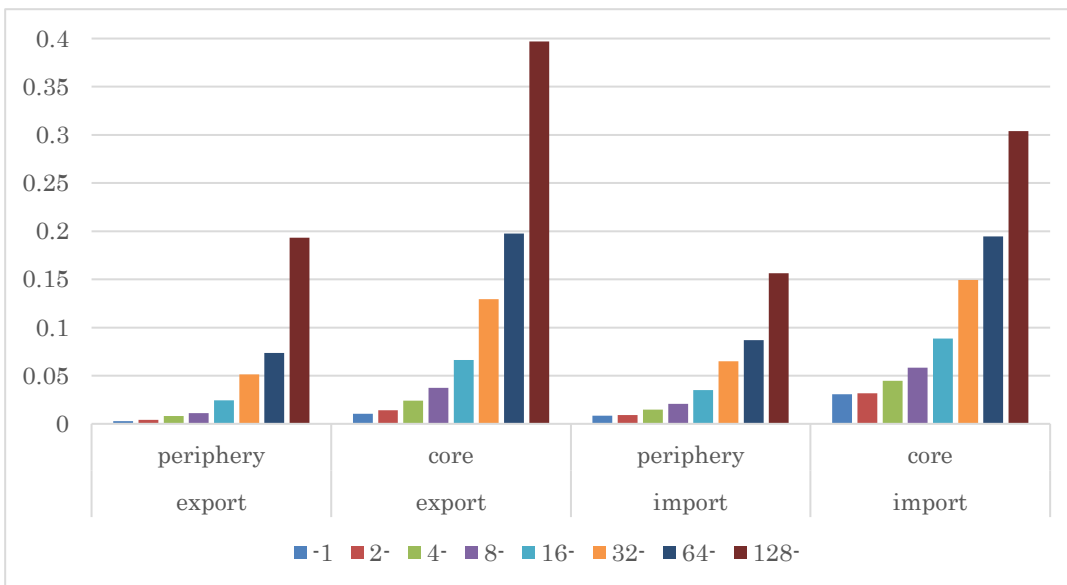
Source: Authors' computation from the TSR

Figure 11: Proportion of exporters and importers by firm size (number of employees), core/periphery, Wholesale
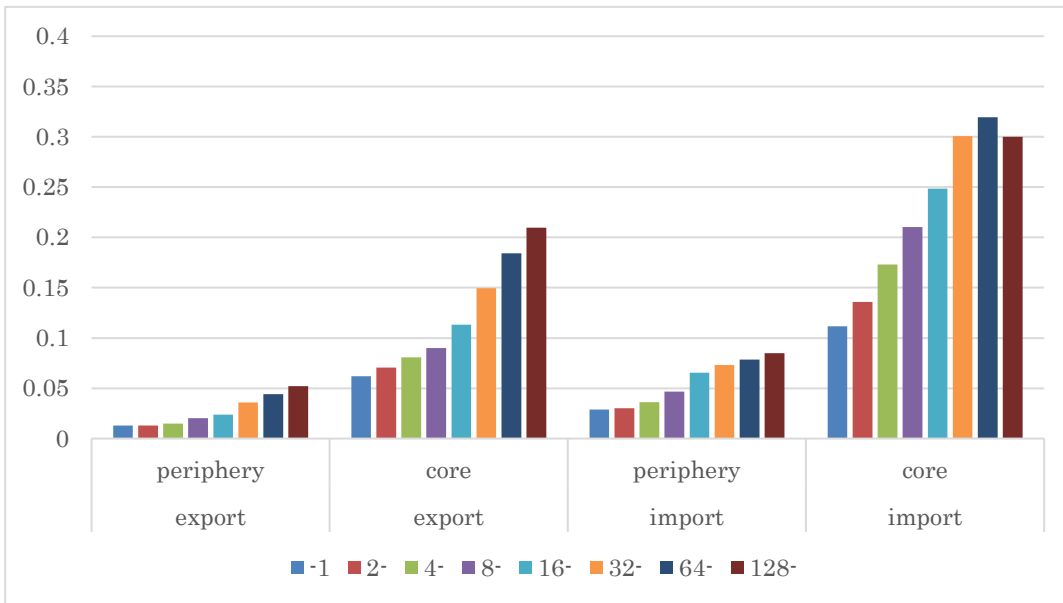
Source: Authors' computation from the TSR

Figure 12: Proportion of exporters and importers by firm size (sales value), core/periphery, Manufacturing
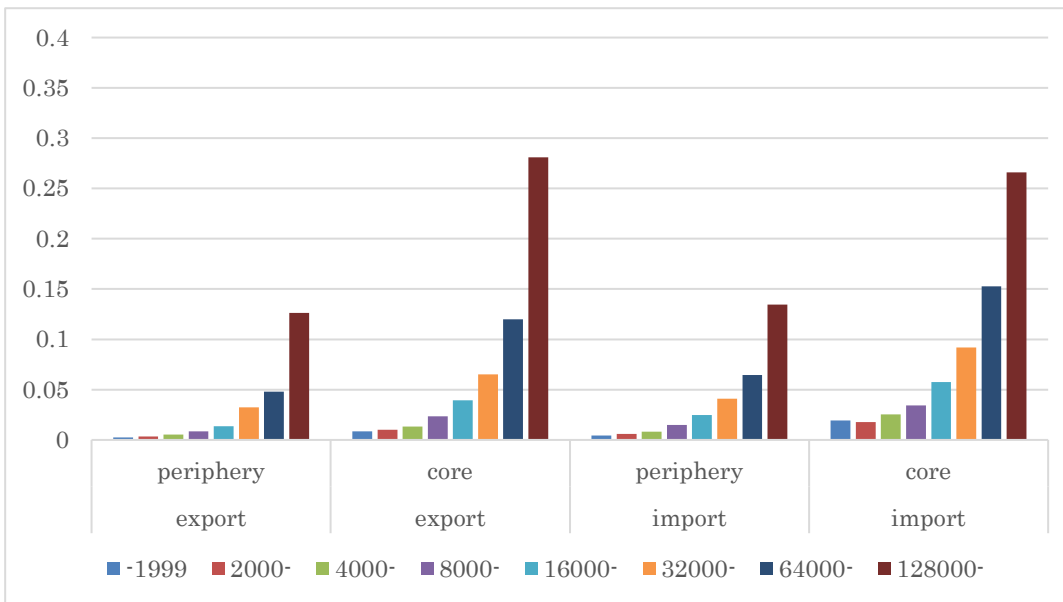
Source: Authors' computation from the TSR

Figure 13: Proportion of exporters and importers by firm size (sales value), core/periphery, Wholesale
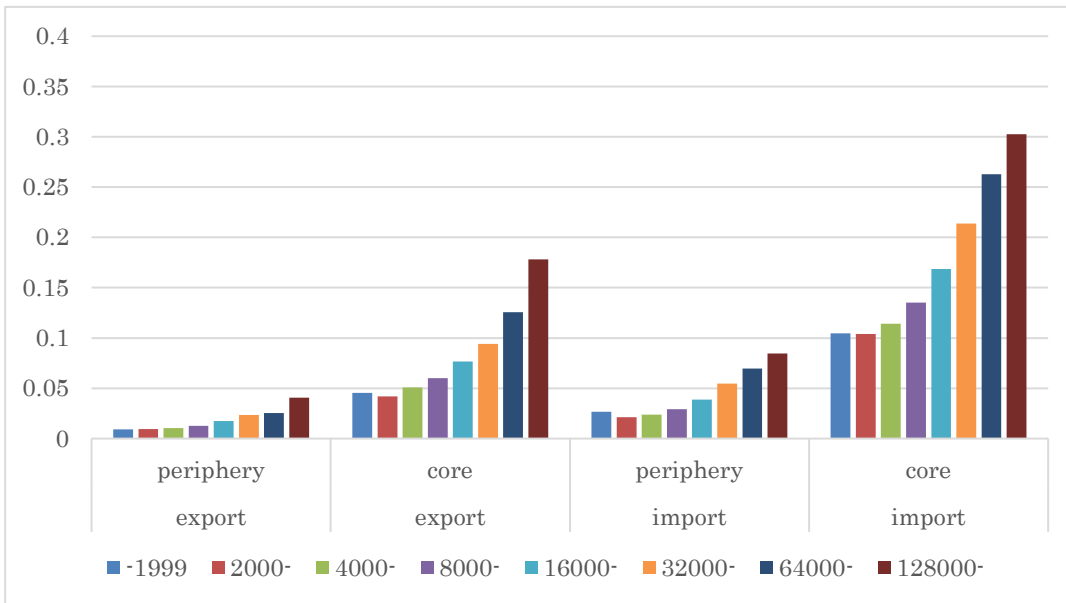
Source: Authors' computation from the TSR

Figure 14: Proportion of exporters and importers by firm size (sales value per employee), core/periphery, Manufacturing
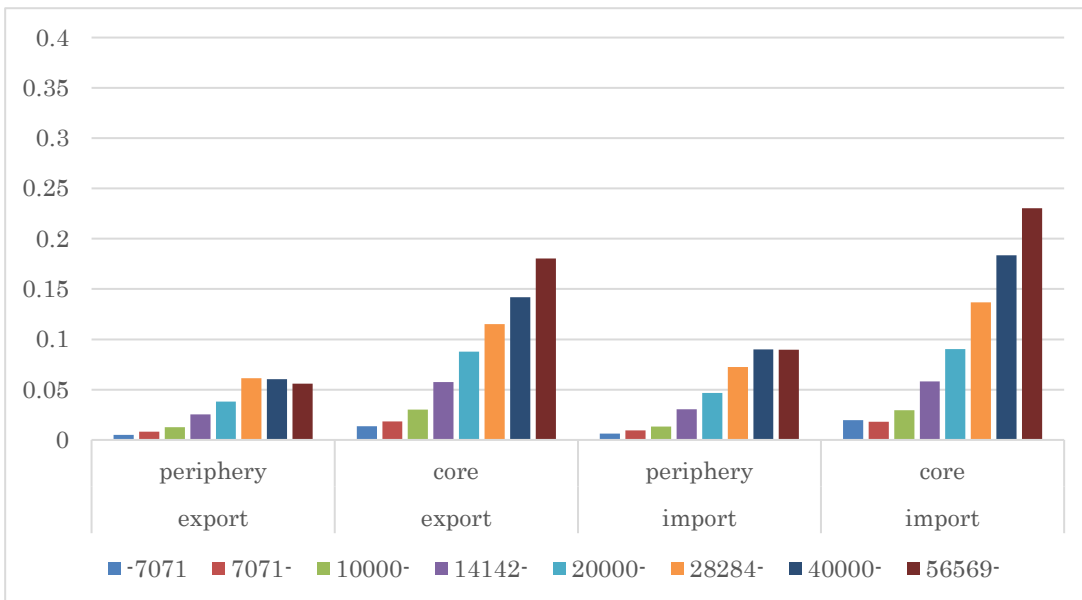
Source: Authors' computation from the TSR

Figure 15: Proportion of exporters and importers by firm size (sales value per employee), core/periphery, Wholesale
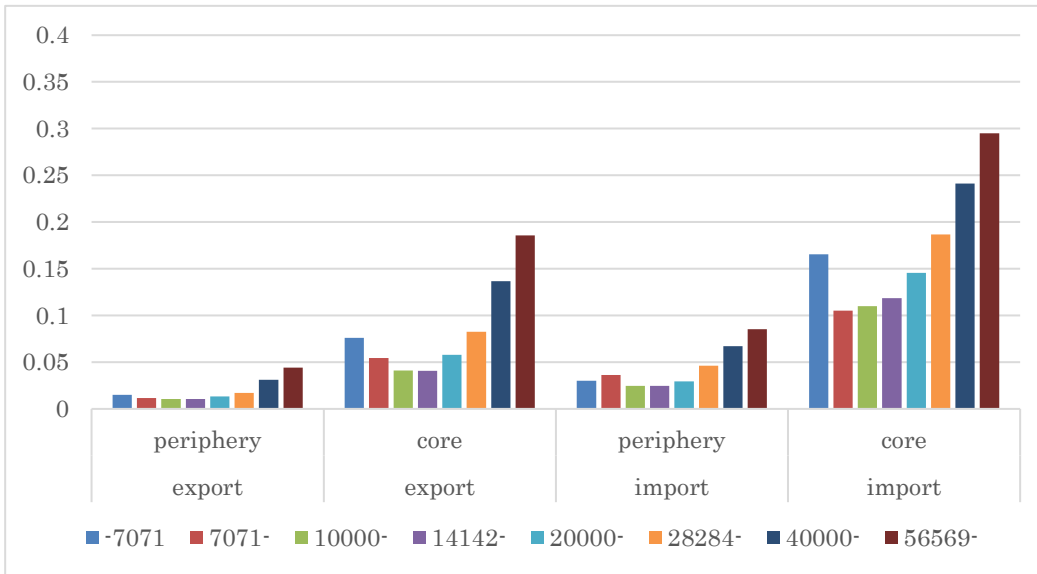
Source: Authors' computation from the TSR

Figure 16: Share of direct and indirect exporters
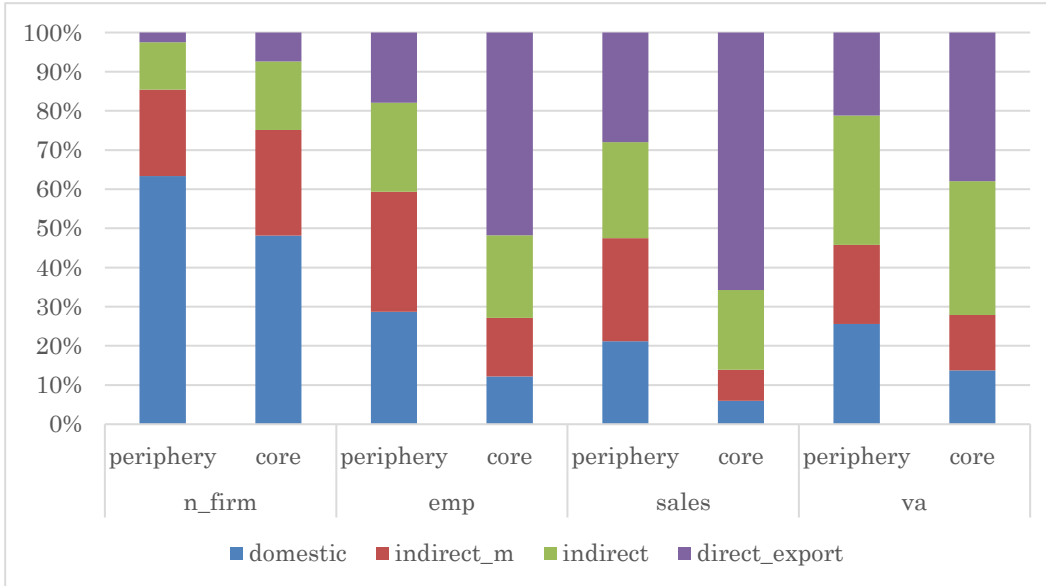
Note: *n_firm, emp, sales, va,* represents number of firms, number of employees, sales value, and value-added, respectively. *direct_exports, indirect, indirect_m, and domestic* each corresponds to the definition in the main text, i.e., a) direct exports, b) indirect exports through wholesalers, c) indirect exports through other manufacturers and d) domestic transaction only, respectively.

Source: Authors' computation from the TSR

Figure 17: Share of direct and indirect imports
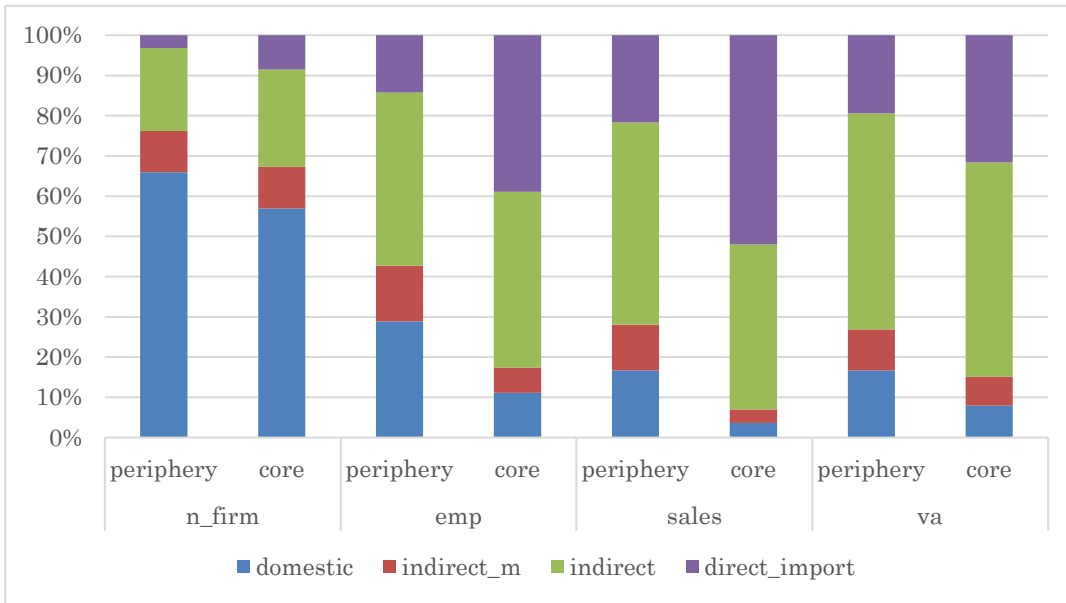
Source: Authors' computation from the TSR

Table 1: Estimation results for direct exports

VARIABLES	manu d_export	manu d_export	manu d_export	whole d_export	whole d_export	whole d_export
Core	0.364***	0.449***	0.346***	0.632***	0.680***	0.633***
	(0.0149)	(0.0146)	(0.0138)	(0.0158)	(0.0154)	(0.0157)
Log of sales value	0.342***			0.183***		
	(0.00384)			(0.00353)		
Log of the number of employees		0.400***			0.179***	
		(0.00465)			(0.00478)	
Log of sales value per employee			0.431***			0.297***
			(0.00796)			(0.00640)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	136,147	137,392	135,588	114,729	115,624	114,295

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Estimation results for direct imports

VARIABLES	manu d_import	manu d_import	manu d_import	whole d_import	whole d_import	whole d_import
Core	0.373***	0.452***	0.333***	0.707***	0.749***	0.714***
	(0.0133)	(0.0128)	(0.0129)	(0.0121)	(0.0119)	(0.0120)
Log of sales value	0.288***			0.174***		
	(0.00341)			(0.00294)		
Log of the number of employees		0.297***			0.195***	
		(0.00407)			(0.00405)	
Log of sales value per employee			0.479***			0.245***
			(0.00740)			(0.00521)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	136,147	137,392	135,588	114,729	115,624	114,295

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Indirect to direct export nexus, panel linear probability estimation

Dependent variable: Direct export in year t (d_export$_t$)

VARIABLES	(1) all	(2) all	(3) periphery	(4) core	(5) all	(6) all	(7) periphery	(8) core	(9) all	(10) all	(11) periphery	(12) core
d_indirect_export$_{t-1}$	0.00101*	0.00101*	0.00146**	0.000549	0.00109*	0.00109*	0.00148**	0.000699	0.00106*	0.00106*	0.00151**	0.000614
	(0.000593)	(0.000593)	(0.000706)	(0.000955)	(0.000591)	(0.000591)	(0.000704)	(0.000952)	(0.000594)	(0.000594)	(0.000708)	(0.000956)
core		0.00132				0.00115				0.00126		
		(0.00392)				(0.00372)				(0.00394)		
lnsales$_{t-1}$	0.00240***	0.00240***	0.00205***	0.00294***								
	(0.000372)	(0.000372)	(0.000416)	(0.000637)								
lnemp$_{t-1}$					0.00199***	0.00199***	0.00168***	0.00236***				
					(0.000456)	(0.000456)	(0.000501)	(0.000798)				
lnsales_emp$_{t-1}$									0.000867***	0.000867***	0.000738**	0.00114**
									(0.000323)	(0.000323)	(0.000360)	(0.000556)
d_import$_{t-1}$												
d_indirect_import$_{t-1}$												
Observations	545,858	545,858	291,143	254,715	549,445	549,445	292,112	257,333	543,163	543,163	289,570	253,593
R-squared	0.559	0.559	0.535	0.573	0.558	0.558	0.534	0.571	0.559	0.559	0.532	0.574

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All the estimations include the year fixed effects, the industry fixed effects, and the firm fixed effects.

Table 3 continued

Dependent variable: Direct export in year t (d_export_t)

VARIABLES	(13) all	(14) all	(15) periphery	(16) core	(17) all	(18) all	(19) periphery	(20) core	(21) all	(22) all	(23) periphery	(24) core
$d\_indirect\_export_{t-1}$	0.00100*	0.00100*	0.00143**	0.000589	0.00107*	0.00107*	0.00142**	0.000724	0.00105*	0.00105*	0.00147**	0.000646
	(0.000593)	(0.000593)	(0.000707)	(0.000957)	(0.000592)	(0.000592)	(0.000705)	(0.000953)	(0.000594)	(0.000594)	(0.000709)	(0.000957)
core		0.00130				0.00114				0.00126		
		(0.00392)				(0.00372)				(0.00394)		
$lnsales_{t-1}$	0.00235***	0.00235***	0.00201***	0.00288***								
	(0.000372)	(0.000372)	(0.000416)	(0.000638)								
$lnemp_{t-1}$					0.00198***	0.00198***	0.00167***	0.00235***				
					(0.000456)	(0.000456)	(0.000501)	(0.000798)				
$lnsales\_emp_{t-1}$									0.000832***	0.000832***	0.000712**	0.00109**
									(0.000323)	(0.000323)	(0.000360)	(0.000556)
d_import_{t-1}	0.0164***	0.0164***	0.0164***	0.0148***	0.0160***	0.0160***	0.0164***	0.0141***	0.0164***	0.0164***	0.0165***	0.0147***
	(0.00169)	(0.00169)	(0.00227)	(0.00252)	(0.00168)	(0.00168)	(0.00226)	(0.00250)	(0.00170)	(0.00170)	(0.00228)	(0.00252)
$d\_indirect\_import_{t-1}$	-0.000258	-0.000259	8.08e-05	-0.000794	3.02e-05	2.99e-05	0.000397	-0.000531	-0.000176	-0.000177	0.000118	-0.000665
	(0.000546)	(0.000546)	(0.000624)	(0.000913)	(0.000545)	(0.000545)	(0.000623)	(0.000911)	(0.000547)	(0.000547)	(0.000627)	(0.000914)
Observations	545,858	545,858	291,143	254,715	549,445	549,445	292,112	257,333	543,163	543,163	289,570	253,593
R-squared	0.560	0.560	0.535	0.573	0.558	0.558	0.534	0.571	0.560	0.560	0.532	0.574

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All the estimations include the year fixed effects, the industry fixed effects, and the firm fixed effects.

Table 4: Indirect to direct import nexus, panel linear probability estimation

Dependent variable: Direct import in year t (d_import_t)

VARIABLES	(1) all	(2) all	(3) periphery	(4) core	(5) all	(6) all	(7) periphery	(8) core	(9) all	(10) all	(11) periphery	(12) core
$d\_indirect\_import_{t-1}$	6.54e-06	4.53e-06	0.000489	-0.000708	0.000366	0.000363	0.000377	7.55e-05	7.25e-05	6.96e-05	0.000389	-0.000516
	(0.000534)	(0.000534)	(0.000598)	(0.000902)	(0.000534)	(0.000534)	(0.000597)	(0.000901)	(0.000535)	(0.000535)	(0.000599)	(0.000903)
core		0.00622				0.00775**				0.00863**		
		(0.00398)				(0.00381)				(0.00400)		
$lnsales_{t-1}$	0.00249***	0.00249***	0.00179***	0.00354***								
	(0.000371)	(0.000371)	(0.000403)	(0.000647)								
$lnemp_{t-1}$					0.00106**	0.00106**	0.000294	0.00210**				
					(0.000456)	(0.000456)	(0.000486)	(0.000814)				
$lnsales\_emp_{t-1}$									0.00141***	0.00141***	0.00121***	0.00179***
									(0.000321)	(0.000321)	(0.000348)	(0.000564)
d_export_{t-1}												
$d\_indirect\_export_{t-1}$												
Observations	540,684	540,684	289,110	251,574	544,205	544,205	290,085	254,120	538,033	538,033	287,554	250,479
R-squared	0.583	0.583	0.549	0.599	0.581	0.581	0.547	0.596	0.583	0.583	0.549	0.599

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All the estimations include the year fixed effects, the industry fixed effects, and the firm fixed effects.

Table 4 continued

Dependent variable: Direct import in year t (d_import$_t$)

VARIABLES	(13) all	(14) all	(15) periphery	(16) core	(17) all	(18) all	(19) periphery	(20) core	(21) all	(22) all	(23) periphery	(24) core
d_indirect_import$_{t-1}$	-3.41e-05	-3.61e-05	0.000493	-0.000779	0.000320	0.000317	0.000380	-5.87e-06	2.92e-05	2.61e-05	0.000392	-0.000590
	(0.000534)	(0.000534)	(0.000599)	(0.000903)	(0.000534)	(0.000534)	(0.000597)	(0.000902)	(0.000535)	(0.000535)	(0.000600)	(0.000904)
core		0.00631				0.00784**				0.00872**		
		(0.00398)				(0.00381)				(0.00400)		
lnsales$_{t-1}$	0.00247***	0.00247***	0.00179***	0.00350***								
	(0.000371)	(0.000371)	(0.000403)	(0.000648)								
lnemp$_{t-1}$					0.00104**	0.00104**	0.000294	0.00207**				
					(0.000456)	(0.000456)	(0.000486)	(0.000814)				
lnsales_emp$_{t-1}$									0.00140***	0.00140***	0.00121***	0.00177***
									(0.000321)	(0.000321)	(0.000348)	(0.000564)
d_export$_{t-1}$	0.00871***	0.00873***	0.000528	0.0127***	0.00872***	0.00873***	0.000644	0.0126***	0.00883***	0.00885***	0.000628	0.0128***
	(0.00168)	(0.00168)	(0.00224)	(0.00250)	(0.00168)	(0.00168)	(0.00224)	(0.00250)	(0.00168)	(0.00168)	(0.00225)	(0.00250)
d_indirect_export$_{t-1}$	0.000225	0.000225	-0.000138	0.000360	0.000303	0.000302	-9.96e-05	0.000458	0.000267	0.000267	-0.000105	0.000419
	(0.000601)	(0.000601)	(0.000694)	(0.000987)	(0.000600)	(0.000600)	(0.000692)	(0.000986)	(0.000601)	(0.000601)	(0.000695)	(0.000988)
Observations	540,684	540,684	289,110	251,574	544,205	544,205	290,085	254,120	538,033	538,033	287,554	250,479
R-squared	0.583	0.583	0.549	0.599	0.581	0.581	0.547	0.596	0.583	0.583	0.549	0.599

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All the estimations include the year fixed effects, the industry fixed effects, and the firm fixed effects.

Table 5: Direct (indirect) exports (imports) and sales value

VARIABLES	(1) sales all	(2) sales all	(3) sales periphery	(4) sales core	(5) sales all	(6) sales all	(7) sales periphery	(8) sales core	(9) sales all	(10) sales all	(11) sales periphery	(12) sales core
d_export	0.0845***	0.0845***	0.0890***	0.0837***					0.0732***	0.0732***	0.0770***	0.0729***
	(0.00494)	(0.00494)	(0.00858)	(0.00609)					(0.00502)	(0.00502)	(0.00871)	(0.00620)
d_indirect_export	0.0275***	0.0275***	0.0279***	0.0271***					0.0258***	0.0259***	0.0262***	0.0256***
	(0.00216)	(0.00216)	(0.00317)	(0.00294)					(0.00216)	(0.00216)	(0.00318)	(0.00294)
core		-0.0252*				-0.0259**				-0.0256**		
		(0.0129)				(0.0129)				(0.0129)		
d_import					0.0787***	0.0787***	0.0828***	0.0776***	0.0668***	0.0669***	0.0703***	0.0660***
					(0.00484)	(0.00484)	(0.00853)	(0.00595)	(0.00492)	(0.00492)	(0.00867)	(0.00605)
d_indirect_import					0.0287***	0.0287***	0.0262***	0.0312***	0.0272***	0.0272***	0.0247***	0.0297***
					(0.00194)	(0.00194)	(0.00274)	(0.00275)	(0.00194)	(0.00194)	(0.00274)	(0.00276)
Observations	779,948	779,948	405,484	374,464	779,948	779,948	405,484	374,464	779,948	779,948	405,484	374,464
R-squared	0.988	0.988	0.988	0.989	0.988	0.988	0.988	0.989	0.988	0.988	0.988	0.989

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All the estimations include the year fixed effects, the firm fixed effects and the industry fixed effects.

Table 6: Direct (indirect) exports (imports) and the number of employees

VARIABLES	(1) emp all	(2) emp all	(3) emp periphery	(4) emp core	(5) emp all	(6) emp all	(7) emp periphery	(8) emp core	(9) emp all	(10) emp all	(11) emp periphery	(12) emp core
d_export	0.0474***	0.0474***	0.0498***	0.0473***					0.0430***	0.0431***	0.0473***	0.0423***
	(0.00399)	(0.00399)	(0.00710)	(0.00480)					(0.00406)	(0.00406)	(0.00722)	(0.00488)
d_indirect_export	0.0176***	0.0176***	0.0155***	0.0188***					0.0166***	0.0166***	0.0145***	0.0179***
	(0.00174)	(0.00174)	(0.00263)	(0.00232)					(0.00175)	(0.00175)	(0.00263)	(0.00232)
core		0.00469				0.00413				0.00449		
		(0.0100)				(0.0100)				(0.0100)		
d_import					0.0341***	0.0341***	0.0233***	0.0383***	0.0272***	0.0272***	0.0155**	0.0317***
					(0.00391)	(0.00391)	(0.00706)	(0.00468)	(0.00397)	(0.00397)	(0.00717)	(0.00476)
d_indirect_import					0.0178***	0.0178***	0.0157***	0.0196***	0.0168***	0.0168***	0.0149***	0.0187***
					(0.00157)	(0.00157)	(0.00227)	(0.00217)	(0.00157)	(0.00157)	(0.00227)	(0.00217)
Observations	787,315	787,315	407,583	379,732	787,315	787,315	407,583	379,732	787,315	787,315	407,583	379,732
R-squared	0.987	0.987	0.985	0.988	0.987	0.987	0.985	0.988	0.987	0.987	0.985	0.988

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All the estimations include the year fixed effects, the firm fixed effects and the industry fixed effects.

Table 7: Direct (indirect) exports (imports) and sales value per employee

VARIABLES	(1) sales_emp all	(2) sales_emp all	(3) sales_emp periphery	(4) sales_emp core	(5) sales_emp all	(6) sales_emp all	(7) sales_emp periphery	(8) sales_emp core	(9) sales_emp all	(10) sales_emp all	(11) sales_emp periphery	(12) sales_emp core
d_export	0.0382***	0.0382***	0.0407***	0.0370***					0.0307***	0.0307***	0.0308***	0.0305***
	(0.00563)	(0.00563)	(0.00983)	(0.00692)					(0.00572)	(0.00572)	(0.00999)	(0.00703)
d_indirect_export	0.0110***	0.0110***	0.0143***	0.00849**					0.0103***	0.0103***	0.0136***	0.00783**
	(0.00246)	(0.00246)	(0.00364)	(0.00334)					(0.00246)	(0.00246)	(0.00364)	(0.00334)
core		0.00519				0.00482				0.00497		
		(0.0148)				(0.0148)				(0.0148)		
d_import					0.0481***	0.0481***	0.0617***	0.0435***	0.0432***	0.0432***	0.0568***	0.0385***
					(0.00552)	(0.00552)	(0.00978)	(0.00676)	(0.00562)	(0.00562)	(0.00994)	(0.00687)
d_indirect_import					0.0128***	0.0128***	0.0118***	0.0135***	0.0122***	0.0122***	0.0110***	0.0130***
					(0.00221)	(0.00221)	(0.00314)	(0.00312)	(0.00222)	(0.00222)	(0.00314)	(0.00313)
Observations	775,904	775,904	403,187	372,717	775,904	775,904	403,187	372,717	775,904	775,904	403,187	372,717
R-squared	0.937	0.937	0.937	0.934	0.937	0.937	0.937	0.934	0.937	0.937	0.937	0.934

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All the estimations include the year fixed effects, the firm fixed effects and the industry fixed effects.