RIETI Discussion Paper Series 17-E-114

Wholesalers, Indirect Exports, Geography, and Economies of Scope: Evidence from firm transaction data in Japan

ITO Tadashi
Gakushuin University

NAKAMURA Ryohei
RIETI

MORITA Manabu
Aomori Chuo Gakuin University

RIETI
Research Institute of Economy, Trade & Industry, IAA

The Research Institute of Economy, Trade and Industry
https://www.rieti.go.jp/en/

RIETI Discussion Paper Series 17-E-114
September 2017

Wholesalers, Indirect Exports, Geography, and Economies of Scope: Evidence from firm transaction data in Japan[1]

ITO Tadashi
Gakushuin University
NAKAMURA Ryohei
Okayama University
MORITA Manabu
Aomori Chuo Gakuin University

Abstract

This study examines wholesalers' roles in manufacturers' exports in Japan. First, it is shown that, as in the case of the manufacturing sector, productivity sorting on overseas activities is also present in the case of wholesalers. Namely, only the most productive wholesaler firms can engage in foreign direct investment, and the next productive ones can participate in export activities, while the least productive ones conduct domestic transactions only. Second, we investigate how wholesalers facilitate manufacturers' export activities in the form of indirect exports. We have found that wholesalers through which manufacturing firms indirectly export their goods are predominantly located in Tokyo or Osaka. The probability of indirect exports is negatively correlated with distance between manufacturers and wholesalers, but there are certain threshold distances at 300 to 500 kilometers, over which the chance of indirect exports turns null. Another notable finding is that wholesalers' productivities have positive correlation with the chance of indirect exports whereas manufacturers' productivities do not matter. The number of manufacturers from which a wholesaler purchases goods is found to have a positive correlation with the probability of indirect exports, which is a type of economies of scope effect.

Keywords: Wholesalers, Productivity, Regional economies, Indirect exports, Economies of scope
JEL classification: R10, F10

[1]This study is conducted as a part of the project "Regional Economic Structural Analysis and its Application to Regional Creation" undertaken at the Research Institute of Economy, Trade and Industry (RIETI). This study utilizes the micro data of the questionnaire information based on the "Basic Survey of Japanese Business Structure and Activities" and the "Basic Survey on Overseas Business Activities," which are conducted by the Ministry of Economy, Trade and Industry (METI). The author is grateful for helpful comments and suggestions by Discussion Paper seminar participants at RIETI.

1. INTRODUCTION

Revival of regional economies is one of the core policy objectives of the Japanese government as in many countries, especially developed nations. An acute problem Japan faces is the population aging and subsequent shrink of the economy. The problem is particularly eminent for regional economies, which are suffering both from low fertility rate and de-location of youngsters from local areas to cities. As one of the strategies to reinvigorate regional economies, the Japanese government aims to expand its economic relations with steadily growing Asian economies, especially China and the South East Asian economies.

It is widely known that wholesalers play important role in economic activities (see, for example, Ahn et al. (2011), Bernard et al. (2010), or Crozet et al. (2013). It is especially the case in Japan, where general trading houses (Sogo Shosha) are involved in many business transactions. Despite these circumstances, the role of wholesalers in manufacturers' overseas sales is not sufficiently known. This paper aims to investigate the role of wholesalers for the economic activities, especially focusing on their roles on indirect exports of manufacturers in regional economies. To be more specific, first, it studies whether wholesalers and/or manufacturers' productivities are important determinants of indirect exports. Second, it analyses whether there are certain levels of threshold distance for the relation between manufacturers and wholesalers, which is an especially important issue when we think about regional economies. Third, we investigate on the economies of scope effect. Wholesalers export many kind of goods from many producers, thus are able to spread the fixed cost of exports, as a result, facilitating manufacturers' indirect exports (Akerman (2016)).

Literature

Our empirical investigation follows the recent literature on firms' overseas activities. Since the seminal paper of Melitz (2003) and Helpman, Melitz and Yeaple (2004), a large number of articles have verified the hypotheses of these papers in the manufacturing sector. Okubo and Tomiura (2013) added a regional perspective in the issue of firm productivity and exports. They found that that the productivity premium of exporters tends to be significantly smaller in regions proximate to the core and in regions with higher market potential, using Japanese firm level data. In the area of wholesalers' productivities and exports, Tanaka (2013) documented that the same relations between firm productivities and overseas' activities holds true also in the wholesalers using Japanese firm level data. As is widely recognised, wholesalers are actively involved in manufacturers' exports as intermediaries. In the light of this importance of the wholesalers for their roles of intermediation, we investigate primarily on the role of wholesalers for manufacturing firms' indirect exports, taking regional aspects into consideration, using Japan's firm level data including transaction data among firms. Admittedly, it has just been found that our paper is not the first paper to investigate the indirect exports of Japanese firms as other researchers are also independently working on similar issues (see

Fujii, Ono and Saito (2016). However, our paper contributes to the literature by its novel findings on the issue, such as the distance threshold for indirect exports, predominant importance of wholesalers' productivity but no significant effect of manufacturing firms' productivity on indirect exports, and economies of scope effects.

2. DATA

We use firm level data of Basic Survey of Japanese Business Structure and Activities (Kigyo Katsudo Kihon Chosa), administered by the Ministry of Economy, Trade and Industry (METI), mainly for total factor productivity computation. This survey is conducted to acquire a collective and quantitative understanding of the actual conditions of diversification, globalization, internationalization and soft economy of Japanese enterprises to plan various administrative policies from a broad perspective, and to obtain basic data for the implementation of these policies. The scope of this survey covers enterprises with 50 or more employees and whose paid-up capital or investment fund is over 30 million yen, whose operation falls under the mining, manufacturing, and wholesale and retail trade, and eating and drinking places (excluding "Other eating and drinking places").[1]

We also use firm level data of Basic Survey on Overseas Business Activities (Kaigai Jigyo Katsudo Kihon Chosa), administered also by METI, to investigate FDI activities of wholesalers. The objective of this survey is to present the actual conditions concerning overseas business activities of Japanese corporations that will serve as a basis for propulsion of future industrial and trade policies. The survey method was separating this survey into two parts. One is the Basic survey which is more detailed and carried out every three years. The other is the Trend survey which is comparatively rough and carried out between the Basic surveys. Survey targets are as follows. a. Parent Companies: Japanese corporations which, as of the end of March, own or have owned overseas affiliates in the past, excluding those in the financial and insurance industry or real estate industry (hereinafter referred to as "Parent Companies"). b. Overseas affiliate: the following overseas affiliates are surveyed."Subsidiaries" and "Sub-subsidiaries" are collectively referred to as "overseas affiliates."

1. A foreign affiliate in which a Japanese corporation has invested capital of 10% or more
2. A foreign affiliate in which a "subsidiary," funded more than 50% by a Japanese corporation, has invested capital of more than 50%
3. A foreign affiliate in which a Japanese corporation and a subsidiary funded more than 50% by a Japanese corporation have invested capital of more than 50%.[2]

[1] The explanation is directly taken from METI website.

[2] The explanation is directly taken from METI website.

For some supplemental analyses, we use Census of Manufacture (2014), METI, Census of Commerce (2014), METI, and Basic Survey on Small and Medium Enterprises, Small and Medium Enterprises Agency, 2011 – 2015.

Transaction data among firms are from the Tokyo Shoko Research Data Bank (TSR data). The TSR Data Bank is one of the largest databases compiled by a private company and it records both listed and non-listed companies in Japan. The main information in the dataset includes transaction data both sales and purchase between firms and several facts about each firm, including the year of establishment, the paid-up capital, the total sales value and the number of employees.

3. ANALYSES

This section provides, first, overall picture of Japanese wholesalers' overseas activities, and second, descriptive analyses on transactions between manufacturers and wholesalers, including distance.

3.1. *Wholesalers' productivity and overseas activities*

This subsection overviews the stylized facts on the relation between wholesalers' productivities and overseas activities. Total Factor Productivity (TFP) is computed for all firms in wholesale sector using the yearly data from 1994 to 2012 in Basic Survey of Japanese Business Structure and Activities, following the method of Levinsohn and Petrin (2003).[3] As Figure 1 shows, the total factor productivity shows a typical right-skewed distribution, meaning that there are an increasingly smaller number of wholesalers in higher productivities. Figure 2 classifies the wholesalers into three sales activity types: Overseas affiliates (FDI), Exports and domestic sales, Domestic sales only. The figure shows that there is a productivity sorting for wholesalers' sales activities, a fact which confirms the finding of Tanaka (2013). As we investigate regional aspects of wholesalers' roles, we grouped the wholesalers into the ones located in Tokyo or Osaka, the two overwhelmingly large cities in Japan, and the ones located in non-Tokyo-Osaka areas. As Figure 3 shows there are more productive firms in Tokyo or Osaka. As Basic Survey of Japanese Business Structure and Activities does not have the information on which countries the firms have their affiliates, we have made a concordance of firms in the Basic Survey of Japanese Business Structure and Activities with the firms in Basic Survey on Overseas Business Activities using the firm ID concordance table provided by RIETI. As Table 1 shows, wholesaler firms which have FDI affiliates are predominantly located in Tokyo or Osaka. Whereas the host countries of wholesaler firms in Tokyo or Osaka spreads across Asia, Europe and the U.S. those of non-Tokyo-Osaka area are concentrated in Asian countries, especially China. This

[3] The end year of 2012 comes from the availability of several supplemental information, such as average working hours per person and capital depreciation rates. For the estimation, we used "levpet" command constructed by Petrin, Poi and Levinsohn (2004).

indicates that it is easier for wholesaler firms in local regions to expand its business activities to nearby countries than distant countries. In addition to the analysis of Figure 2, as a robustness checks, we have checked the labour productivity of small and medium sized enterprises (SMEs) by their exporter status, using Basic Survey on Small and Medium Enterprises, because most firms in regional economies are SMEs. Table 2 shows the labour productivity of exporters are substantially higher than non-exporters. Furthermore, in Figure 4, we have computed the direct export values and sales per worker of wholesalers, using Census of Commerce, METI. Wholesalers with larger export values have higher sales per worker, a measure of productivity.

3.2. *Transaction between manufacturing firms and wholesaler firms*

Having seen the overall picture on Japanese wholesalers' overseas activities, we turn to our main analyses of transactions between manufacturing firms and wholesaler firms. For this purpose, we use the Tokyo Shoko Research Data Bank (TSR data). TSR data for the year 2014 includes the information of exports (and imports) in addition to the transaction data. From the whole dataset, we have extracted the transaction data of manufacturers' sales to wholesalers as our focus here is the role of wholesalers on manufacturers' exports. When manufacturers' export status is recorded as "yes", we count it as direct exports whereas when manufacturers' answer is "no exports" but wholesalers to which the manufacturers sell their products have export status, we define it as indirect exporters. Admittedly this is not a perfect definition of indirect exports. It overestimates the true number of indirect exports, in which wholesalers just act as intermediaries. However, given the available information, this is the best we can do and what other researchers do (See Fujii, Ono and Saito (2016), for example.). Table 3 shows the number of manufacturing firms which have transactions with wholesalers in the first column, the number of direct exporters in the second column, the proportion of direct exporters in the third column, the number of indirect exporters in the fourth column, the proportion of indirect exporters in the fifth column, and the proportion of direct or indirect exporters in the seventh column. In total, the proportion of direct exporters is 4.5% while that of indirect exporters is 14.5%. By prefecture, Tokyo (8.6%), Kanagawa (7.8%), and Osaka (7.0%) have a relatively high share of direct exporters. As the fifth column shows, the proportion of indirect exporters is relatively high in Kansai area, which includes Osaka, Hyogo, Nara, Wakayama, and Hokuriku area, which includes Ishikawa and Fukui. Table 4 looks at the location of wholesalers to which manufacturers sell their products. A notable finding is that predominantly large number of manufacturers indirectly export their products through wholesalers located in Tokyo. For example, in Hokkaido, 545 manufacturing firms export their goods indirectly through wholesalers. Out of this 545 manufacturing firms, 395 firms (representing 72.48%) indirectly export their goods through wholesalers located in Tokyo. The highest number is for Akita, with 83.33%. Hokuriku area has relatively smaller ratios, especially Fukui (34.71%). Turning to the indirect exports through wholesalers *within* the same prefecture, except Tokyo, Osaka, Aichi areas, the "within prefecture" ratios are relatively high in Yamagata, Nagano, and Okinawa. As a supplemental indicative

information on large cities' centripetal force to collect goods and export them, in Figure 5, we have plotted the relation between the output and the wholesale direct exports of the textile and apparel sector as an example, using firm-level data of Census of Manufacture (2014), METI and Census of Commerce (2014), METI. Large cities such as Tokyo, Hyogo and Osaka show substantially higher wholesale export values relative to its outputs, as indicated by their locations above the OLS regression line.

3.3. *Distance, transactions and indirect exports*

This section provides analytical findings on the relation between distance and transaction/indirect exports. We have computed distance between locations of manufacturers and wholesalers and merged those data into the transaction data of the TSR.[4] Table 5 and Table 6 show the summary statistics of distance. The average distance for transaction is approximately 198 kilometers, whereas the average distance for indirect exports is approximately 227 kilometers, indicating that manufacturers need to overcome additional 30 kilometers to reach wholesalers to indirectly export their goods. Table 7 shows the distance by prefecture. Except Tokyo, adjacent prefectures of Tokyo (Saitama, Chiba, and Kanagawa) and Shizuoka, the distance for the indirect exports is larger than that for the transactions. The difference between the distance of transactions and that of indirect exports stands out especially for prefectures far away from Tokyo. This indicates that the wholesalers which indirectly export manufacturers' goods are predominantly located in Tokyo and, to some extent, Osaka area.

3.4. *Economies of scope*

A prominent feature of wholesalers is its transactions with many business partners. The wholesalers could probably spread the export related cost (the "beach-head cost" (Baldwin (1989)) by exporting products of many business partners, a kind of "economies of scope". At the best of our knowledge, this paper is the first empirical attempt to investigate such issue using firm-level transaction level data.[5] Table 6 shows the histogram for the number of manufacturing firms from which each wholesaler purchase products. It varies from a few to 1000, with the mean value of 176.485. Analyses on this issue is treated below in section 4.

[4] We have used CSV address matching service of Geocoding Tools & Utilities, run by Center for Spatial Information Science, The University of Tokyo for the information of latitude and longitude. Using the information, we have computed distance by great-circular distance.

[5] Akerman (2016) uses the customs data of Sweden, defining wholesalers' exports as indirect exports, whereas our paper directly utilises transaction data to define indirect exports.

4. ESTIMATION

In this section, we do estimation analyses for the above mentioned issues, namely, the effects of distance, productivity and the economies of scope on the probability of indirect exports. As the data from the TSR only have the information on the *actual* transaction partners, in order to mitigate the bias from the selection effect, we have generated *potential* pairs of manufacturers and wholesalers within the relevant industry codes (at 4-digit)[6]. As the dependent variable is binary, we use Probit estimation[7]:

$$\Pr(y=1 \mid x) = \int_{-\infty}^{\beta' x} \phi(v)dv = \Phi(\beta' x)$$

where y takes 1 when the dependent variable, i.e. the indirect export is "yes", and 0 otherwise. x is the vector of explanatory variables, i.e., log of distance, log of manufacturers' productivity, log of wholesalers' productivity, log of the number of manufacturers from which wholesalers purchase goods[8], and the manufacturer industry fixed effects and the wholesaler industry fixed effects. β' is the vector of parameters. $\phi(v)$ is a standard normal density function. We do the analyses for cross-sectional data for the year 2012. As the export status data is available only for the year 2014, whereas our TFP computation was possible only up to the year 2012 as mentioned above. We have assumed that the export status did not change from 2012 to 2014 and combined the export status data of the year 2014 into the main data of the year 2012. Given the non-panel structure of the data, admittedly, we cannot confirm causal relationship, but at least we can study correlations.

Before using TFP for productivity, we simply use labour productivity both for manufacturers and wholesalers because the number of observations substantially drops when we use the TFP, the issue discussed later. Table 8 shows the Probit estimation results. The first column includes the whole data, i.e., all firms in all prefectures. The second column excludes wholesalers located in Tokyo or Osaka, and the third column excludes both manufacturers and wholesalers located in Tokyo or Osaka. As we expect, distance have highly statistically significant negative coefficients. A notable finding is that wholesalers' labour productivity matters much whereas manufacturers' labour productivity have the opposite sign with very small magnitudes, i.e., close to zero. The number of clients, which represent the number of manufacturers from which wholesalers purchase goods, a proxy variable for

[6] We define the relevant industry code pairs at 4 digit as the 4 digit code pairs for which there is at least one actual transaction between a manufacturer (seller) and a wholesaler (buyer).

[7] We have done the same estimations by Logit model, which yielded the almost identical results with those of Probit.

[8] It is defined as the number of manufacturers from which a wholesaler buys goods within the 2-digit industry code of a manufacturer. For example, if a manufacturer is in the industry code: 35, the number of manufacturers in the industry code: 35 from which each wholesaler purchase goods is counted.

the economies of scope, shows highly statistically significant positive coefficients. This suggests the economies of scope effect.

As the TSR data are about firms, not their plants or affiliates, the distance is measured between the manufacturing firms headquarters and the wholesaler firms headquarters. To address this potential bias, we have excluded those firms which have more than one establishment, and have done the same estimation. The results shown in Table 9 are very similar.

As a robustness check, we use the TFP computed from Basic Survey of Japanese Business Structure and Activities for the productivity. Because the firm coverage of TSR data is far larger than that of Basic Survey of Japanese Business Structure and Activities and moreover, there is no concordance for firm ID between the TSR and Basic Survey of Japanese Business Structure and Activities, we concorded the firms in each data set by phone numbers. As an inevitable consequence, the number of observations substantially dropped. Table 10 shows the results. All the coefficient estimates are highly statistically significant at 0.1 percent, except manufacturers' TFP. Compared with the results in Table 8, the distance coefficient becomes more negative, whereas wholesalers' TFP and the number of clients show more positive numbers. On the other hand, manufacturers' TFP shows no correlation with the probability of indirect exports.

Our finding of little impact of manufacturers' productivity is somewhat at odds with the previous literature's findings. To check if the coefficient estimates for the manufacturers' productivity are biased through potentially high correlation with the wholesalers' productivity, we have excluded the wholesalers' productivity in the estimation. As the results in Table 11 show, the coefficient estimates for the manufacturers' productivity remain very similar to the original estimation results in Table 8. Table 12 is the case for the total factor productivity, which also shows almost no difference between the case with the wholesalers' productivity and the one without. The previous literature did not include the productivity of the wholesalers in their estimations, because the question is the sales mode choice of manufacturing firms, namely, direct exports, indirect exports and domestic sales only. Contrary to the previous studies, we include the wholesalers' productivity in the estimation. In the previous literature, it is manufacturing firms who engage in searching and bear its cost, which requires a higher operating profit and thus a higher productivity to cover the cost. On the other hand, our finding indicates that the wholesaler firms search for potential manufacturing firms rather than the manufacturing firms' searching for potential wholesalers. [9]

Distance band

Distance effect might not be continuous, but it could be discrete. Namely, manufacturers within a certain distance band, e.g., within 50 kilometers (km) from a potential wholesaler, can have a higher chance to export their goods through the wholesaler. Thus, we have divided the distance into distance

[9] We thank Yukiko Saito at RIETI for this interpretation.

band, 0-25 km, 25-50 km, 50-75 km, etc. and conducted the same estimation as above. Now, we have replaced the distance itself with distance bands, which takes the value 1 if the distance between the manufacturer and the wholesaler is within the distance band (e.g., 25-50km), and 0 otherwise. The result is in Table 13. The first column shows the case for labour productivity with all firms in all the prefecture. The second column is the case excluding manufacturing firms and wholesaler firms located either in Tokyo or Osaka. The third column is the case with the total factor productivity for all firms in all the prefectures. The fourth column is the case with total factor productivity excluding manufacturing firms and wholesaler firms located either in Tokyo or Osaka. The coefficient estimates for the distance bands show that the chance of indirect exports turn insignificant or negative when the distance gets farther than 300-500km, indicating some distance threshold at 300-500km. For example, Miyagi prefecture in the north of Japan is approximately 300-400 km from Tokyo, whereas Aomori prefecture is located approximately 700-800 km from Tokyo. The distance threshold seems to partly explain much lower numbers of indirect exporters in Aomori or Akita.

5. CONCLUDING REMARKS AND DISCUSSION

Empirical analyses on wholesalers' roles on manufacturers' export activities are not sufficient enough, nonetheless, important. It is especially so for Japan, which suffers from ailing regional economies. To reinvigorate the regional economies, wholesalers could have important roles. This paper has found the following empirical findings, which can be useful for the policy discussion. First, as in the case of manufacturing sector, a productivity sorting on the overseas activities is also present in the case of wholesalers. Namely, only the most productive wholesaler firms can engage in foreign direct investment, and the next productive wholesaler firms can participate in export activities, and the least productive wholesaler firms do domestic transactions only. Second, we investigate how the wholesalers facilitate manufacturers' export activities in the form of indirect exports. The wholesalers through which manufacturing firms indirectly export their goods are predominantly located in Tokyo or Osaka. The probability of indirect exports is negatively correlated with distance between manufacturers and wholesalers, but there are certain threshold distances at 300 to 500 kilometers, over which the chance of indirect exports turns null. Wholesalers' productivities have positive correlation with the chances of indirect exports whereas manufacturers' productivities do not matter. The number of manufacturers from which a wholesaler purchases goods, is found to have a positive correlation with the probability of indirect exports, a type of economies of scope effect. From the viewpoint of revitalisation of regional economies through exports, the fact that there are wholesalers in regional economies who have overseas activities especially in Asian economies, despite the overwhelming number of wholesalers located in Tokyo or Osaka, is an encouraging news, as Asia boasts of the most rapidly expanding economies. Our finding of distance threshold of 300-500km suggests that the development of regional hub-cities can have a positive impact on manufacturers'

firms' indirect exports in local areas. The finding on the economies of scope effects suggests that it might be useful to encourage networking and match-making between manufacturers and wholesalers.

REFERENCES

Akerman A. (2016). A Theory on the Role of Wholesalers in International Trade Based on Economies of Scope. Canadian Journal of Economics (forthcoming)

Ahn, J., Khandelwal, A. K., and Wei, S. (2011). The Role of Intermediaries in Facilitating Trade. Journal of International Economics, 84(1):73–85.

Baldwin, R. (1988). Hysteresis in Import Prices: The Beachhead Effect," American Economic Review, vol. 7(4), pp. 773-785, 1988.

Bernard, A. B., Jensen, J. B., Redding, S. J., and Schott, P. K. (2010). Wholesalers and Retailers in U.S. Trade. American Economic Review, Papers & Proceedings, 100(2):408–413.

Crozet, M., Lalanne, G., and Poncet, S. (2013). Wholesalers in International Trade. European Economic Review, 58:1–17.

Fujii, D., Ono, Y., and Saito, Y. (2016). Indirect Exports and Wholesalers: Evidence from interfirm transaction network data. RIETI discussion paper series 16-E-068

Helpman, E., Melitz, M., and Yeaple, S. (2004). Export Versus FDI with Heterogeneous Firms. American Economic Review, Vol.94, No.1, 300-316

Levinsohn, J., and Petrin, A. (2003). Estimating Production Functions Using Inputs to Control for Unobservables. Review of Economic Studies (2003) 70, 317–341

Petrin, A., Poi, B., and Levinsohn, J. (2004). Production function estimation in Stata using inputs to control for unobservables. The STATA journal (2004), 4, Number 2, pp. 113–123

Melitz, M. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity, *Econometrica*, 71, 1695-1725.

Okubo, T. and Tomiura, E. (2014). Regional Variations in Productivity Premium of Exporters: Evidence from plant-level data. *RIETI discussion paper* series 13-E-005

Tanaka, A. (2013). Firm Productivity and Exports in the Wholesale Sector: Evidence from Japan, *RIETI discussion paper* series 13-E-007

Tables and Figures

Table 1: Number of overseas affiliates by headquarter location (Tokyo Osaka or not) and host countries, Top 20 host countries

Country name	Tokyo Osaka	Tokyo Osaka share	Non Tokyo Osaka	Non Tokyo Osaka share
China	396	17.6%	199	30.1%
USA	318	14.2%	65	9.8%
UK	161	7.2%	16	2.4%
Thailand	160	7.1%	47	7.1%
Australia	137	6.1%	16	2.4%
Hong Kong	94	4.2%	39	5.9%
Singapore	92	4.1%	23	3.5%
Indonesia	73	3.3%	23	3.5%
Netherlands	66	2.9%	6	0.9%
Malaysia	59	2.6%	14	2.1%
Taiwan	55	2.5%	20	3.0%
Vietnam	51	2.3%	19	2.9%
Brazil	43	1.9%	8	1.2%
Canada	42	1.9%	6	0.9%
Rep. Korea	42	1.9%	16	2.4%
Germany	41	1.8%	14	2.1%
Mexico	38	1.7%	8	1.2%
Philippines	38	1.7%	12	1.8%
India	28	1.2%	15	2.3%
Chile	27	1.2%	3	0.5%

Source: Authors' computation from the firm-level data of Basic Survey of Japanese Business Structure and Activities, METI, and of Basic Survey on Overseas Business Activities, METI.

Table 2: Labor Productivities of Establishments, Direct Exporters and Non-exporters, Small and Medium sized enterprises

			# of Establishments	Labor Productivity (Profit/Employment)
2011	Manufacture	Non-export	8,317	2,863
		Export	872	5,407
	Wholesale	Non-export	3,043	5,627
		Export	958	8,125
2012	Manufacture	Non-export	8,884	3,708
		Export	96	6,407
	Wholesale	Non-export	4,392	6,714
		Export	116	1,262
2013	Manufacture	Non-export	9,332	3,529
		Export	88	6,725
	Wholesale	Non-export	3,834	6,147
		Export	59	11,437
2014	Manufacture	Non-export	15,086	3,420
		Export	136	4,449
	Wholesale	Non-export	7,014	7,342
		Export	123	12,138
2015	Manufacture	Non-export	14,187	3,628
		Export	189	5,984
	Wholesale	Non-export	6,901	6,781
		Export	222	12,182

Notes: Unit of Profit/Employment is Ten Thousand Yen

Source: Basic Survey on Small and Medium Enterprises (Chusyokigyo Jittai Kihon Chosa), Small and Medium Enterprises Agency, 2011 – 2015.

Table 3: Number of direct exporters and indirect exporters in manufacturing sector

	Number of firms	Number of direct exporters	Direct exporters / Number of firms	Number of indirect exporters	Indirect exporters / Number of firms	Percentage of exporters direct or indirect
Hokkaido	4670	42	0.9%	545	11.7%	12.6%
Aomori	917	6	0.7%	85	9.3%	9.9%
Iwate	1354	20	1.5%	146	10.8%	12.3%
Miyagi	1911	31	1.6%	231	12.1%	13.7%
Akita	1201	8	0.7%	90	7.5%	8.2%
Yamagata	2021	35	1.7%	236	11.7%	13.4%
Fukushima	2434	34	1.4%	238	9.8%	11.2%
Ibaraki	3126	49	1.6%	390	12.5%	14.0%
Tochigi	2766	53	1.9%	338	12.2%	14.1%
Gunma	3794	69	1.8%	462	12.2%	14.0%
Saitama	7815	392	5.0%	1142	14.6%	19.6%
Chiba	3379	111	3.3%	604	17.9%	21.2%
Tokyo	23373	2004	8.6%	3731	16.0%	24.5%
Kanagawa	7520	587	7.8%	1008	13.4%	21.2%
Niigata	3883	81	2.1%	465	12.0%	14.1%
Toyama	2057	44	2.1%	239	11.6%	13.8%
Ishikawa	1967	49	2.5%	319	16.2%	18.7%
Fukui	1897	86	4.5%	340	17.9%	22.5%
Yamanashi	1564	69	4.4%	146	9.3%	13.7%
Nagano	3841	146	3.8%	447	11.6%	15.4%
Gifu	3531	104	2.9%	537	15.2%	18.2%
Shizuoka	6668	240	3.6%	928	13.9%	17.5%
Aichi	13055	574	4.4%	2330	17.8%	22.2%
Mie	2633	82	3.1%	303	11.5%	14.6%
Shiga	1467	55	3.7%	214	14.6%	18.3%
Kyoto	4034	237	5.9%	570	14.1%	20.0%
Osaka	15686	1101	7.0%	3212	20.5%	27.5%
Hyogo	5616	312	5.6%	947	16.9%	22.4%
Nara	1376	60	4.4%	272	19.8%	24.1%
Wakayama	1230	33	2.7%	244	19.8%	22.5%
Tottori	600	10	1.7%	38	6.3%	8.0%
Shimane	836	13	1.6%	60	7.2%	8.7%
Okayama	2597	67	2.6%	326	12.6%	15.1%
Hiroshima	4267	103	2.4%	463	10.9%	13.3%
Yamaguchi	1195	35	2.9%	146	12.2%	15.1%
Tokushima	1022	15	1.5%	107	10.5%	11.9%
Kagawa	1770	37	2.1%	201	11.4%	13.4%
Ehime	1959	47	2.4%	219	11.2%	13.6%
Kochi	813	14	1.7%	66	8.1%	9.8%
Fukuoka	4266	108	2.5%	529	12.4%	14.9%
Saga	839	21	2.5%	92	11.0%	13.5%
Nagasaki	961	16	1.7%	103	10.7%	12.4%
Kumamoto	1280	25	2.0%	108	8.4%	10.4%
Oita	1251	15	1.2%	117	9.4%	10.6%
Miyagi	833	10	1.2%	91	10.9%	12.1%
Kagoshima	1287	20	1.6%	109	8.5%	10.0%
Okinawa	687	7	1.0%	86	12.5%	13.5%
Total	163249	7277	4.5%	23620	14.5%	18.9%

Source: Authors' computation from the Tokyo Shoko Research (TSR) Data.

Table 4: Indirect exports and wholesalers' location

Prefecture	Number of indirect exporters	Within the prefecture	Within prefecture ratio	With Tokyo	With Tokyo ratio	With Osaka	With others
Hokkaido	545	22	4.04%	395	72.48%	41	87
Aomori	85	1	1.18%	61	71.76%	6	17
Iwate	146	2	1.37%	120	82.19%	7	17
Miyagi	231	11	4.76%	166	71.86%	23	31
Akita	90	0	0.00%	75	83.33%	3	12
Yamagata	236	29	12.29%	159	67.37%	29	19
Fukushima	238	0	0.00%	178	74.79%	33	27
Ibaraki	390	6	1.54%	282	72.31%	61	41
Tochigi	338	13	3.85%	219	64.79%	60	46
Gunma	462	8	1.73%	331	71.65%	63	60
Saitama	1142	22	1.93%	867	75.92%	138	115
Chiba	604	13	2.15%	464	76.82%	74	53
Tokyo	3731	2893	77.54%	n.a.	n.a.	447	391
Kanagawa	1008	117	11.61%	683	67.76%	119	89
Niigata	465	21	4.52%	297	63.87%	84	63
Toyama	239	21	8.79%	115	48.12%	61	42
Ishikawa	319	30	9.40%	126	39.50%	90	73
Fukui	340	90	26.47%	118	34.71%	94	38
Yamanashi	146	4	2.74%	96	65.75%	14	32
Nagano	447	74	16.55%	254	56.82%	47	72
Gifu	537	42	7.82%	253	47.11%	78	164
Shizuoka	928	127	13.69%	522	56.25%	119	160
Aichi	2330	1056	45.32%	833	35.75%	280	161
Mie	303	13	4.29%	138	45.54%	67	85
Shiga	214	10	4.67%	83	38.79%	83	38
Kyoto	570	65	11.40%	263	46.14%	173	69
Osaka	3212	1406	43.77%	1441	44.86%	n.a.	365
Hyogo	947	165	17.42%	427	45.09%	291	64
Nara	272	2	0.74%	111	40.81%	129	30
Wakayama	244	16	6.56%	99	40.57%	89	40
Tottori	38	0	0.00%	18	47.37%	11	9
Shimane	60	2	3.33%	36	60.00%	13	9
Okayama	326	17	5.21%	169	51.84%	92	48
Hiroshima	463	42	9.07%	260	56.16%	98	63
Yamaguchi	146	11	7.53%	82	56.16%	26	27
Tokushima	107	2	1.87%	52	48.60%	27	26
Kagawa	201	10	4.98%	105	52.24%	58	28
Ehime	219	23	10.50%	103	47.03%	59	34
Kochi	66	3	4.55%	39	59.09%	11	13
Fukuoka	529	77	14.56%	303	57.28%	91	58
Saga	92	7	7.61%	51	55.43%	7	27
Nagasaki	103	31	30.10%	46	44.66%	13	13
Kumamoto	108	0	0.00%	73	67.59%	16	19
Oita	117	18	15.38%	62	52.99%	14	23
Miyazaki	91	0	0.00%	59	64.84%	18	14
Kagoshima	109	2	1.83%	70	64.22%	14	23
Okinawa	86	64	74.42%	21	24.42%	1	0

Source: Authors' computation from the Tokyo Shoko Research (TSR) Data.

Table 5: Summary statistics table of distance for transaction

Variable	Number of observations	Mean	Standard Deviation	Minimum	Maximum
Distance	137841	197.7758	242.6575	0.000095	2759.35

Source: Authors' computation from the Tokyo Shoko Research (TSR) Data and the Distance data we constructed.

Table 6: Summary statistics table of distance for indirect exports

Variable	Number of observations	Mean	Standard Deviation	Minimum	Maximum
Distance	32693	227.2864	243.0092	0.000095	1954.923

Source: Authors' computation from the Tokyo Shoko Research (TSR) Data and the Distance data we constructed.

Table 7: Mean distance for transaction and indirect exports by prefecture

Prefecture	Domestic transaction	Indirect exports
Hokkaido	394.53	876.39
Aomori	277.81	608.75
Iwate	262.32	469.17
Miyagi	235.64	369.01
Akita	310.33	496.62
Yamagata	228.23	322.74
Fukushima	174.92	266.63
Ibaraki	131.05	146.86
Tochigi	136.80	167.71
Gunma	129.15	152.98
Saitama	*112.34*	*104.60*
Chiba	*124.35*	*112.32*
Tokyo	*136.39*	*85.49*
Kanagawa	*125.62*	*96.44*
Niigata	140.69	275.41
Toyama	161.50	227.38
Ishikawa	189.36	229.88
Fukui	148.23	173.18
Yamanashi	117.70	141.11
Nagano	153.77	163.51
Gifu	133.71	167.83
Shizuoka	*148.49*	*147.77*
Aichi	130.13	140.53
Mie	157.56	193.20
Shiga	171.87	191.60
Kyoto	142.23	213.03
Osaka	185.09	218.11
Hyogo	204.97	248.99
Nara	183.95	197.63
Wakayama	214.32	238.73
Tottori	222.36	391.71
Shimane	274.82	431.28
Okayama	232.59	369.95
Hiroshima	268.20	468.03
Yamaguchi	360.66	598.89
Tokushima	222.62	365.78
Kagawa	247.08	380.44
Ehime	282.04	435.12
Kochi	278.20	485.69
Fukuoka	388.95	690.21
Saga	347.69	687.62
Nagasaki	304.58	616.56
Kumamoto	319.08	797.10
Oita	288.07	584.16
Miyazaki	350.71	790.53
Kagoshima	410.53	876.47
Okinawa	314.50	762.81

Source: Authors' computation from the Tokyo Shoko Research (TSR) Data and the Distance data we constructed.

Table 8: Probit estimation for indirect exports, labour productivity

	(1)	(2)	(3)
	All prefectures	Wholesalers No-Tokyo-Osaka	Manufacturers Wholesalers No-Tokyo-Osaka
Dependent variable: Indirect exports (binary)			
Log of distance	-0.0549***	-0.0755***	-0.0625***
	(-104.41)	(-78.84)	(-59.80)
Log of manufacturers' labour productivity	-0.0130***	-0.00616***	-0.00487**
	(-13.02)	(-3.96)	(-2.81)
Log of wholesalers' labour productivity	0.476***	0.338***	0.332***
	(531.16)	(229.86)	(203.00)
Log of the number of clients	0.0854***	0.0668***	0.0644***
	(117.40)	(56.28)	(48.24)
Pseudo R-squared	0.2246	0.1694	0.1715
Number of observations	5727246	3433952	2899086

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: Probit estimation for indirect exports, labour productivity, Single establishment firm only

	(1) All prefectures	(2) Wholesalers No-Tokyo-Osaka	(3) Manufacturers Wholesalers No-Tokyo-Osaka
Dependent variable: Indirect exports (binary)			
Log of distance	-0.0554***	-0.0762***	-0.0639***
	(-91.71)	(-69.82)	(-53.70)
Log of manufacturers' labour productivity	-0.0138***	-0.00516**	-0.00292
	(-11.79)	(-2.83)	(-1.43)
Log of wholesalers' labour productivity	0.478***	0.339***	0.332***
	(463.26)	(200.11)	(176.92)
Log of the number of clients	0.0890***	0.0716***	0.0693***
	(106.28)	(52.24)	(44.92)
Pseudo R-squared			
Number of observations	4327597	2590228	2192699

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10: Probit estimation for indirect exports, total factor productivity

	(1)	(2)	(3)
	All prefectures	Wholesalers No-Tokyo-Osaka	Manufacturers Wholesalers No-Tokyo-Osaka
Dependent variable: Indirect exports (binary)			
Log of distance	-0.0780***	-0.173***	-0.157***
	(-11.96)	(-12.75)	(-10.31)
Log of manufacturers' TFP	0.0356	0.0380	0.0485
	(1.16)	(0.80)	(0.85)
Log of wholesalers' TFP	1.092***	0.647***	0.641***
	(35.12)	(12.35)	(10.56)
Log of the number of clients	0.156***	0.240***	0.244***
	(14.65)	(13.99)	(12.23)
Pseudo R-squared	0.2787	0.2810	0.2814
Number of observations	26988	14926	11338

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 11: Probit estimation for indirect exports, labour productivity, with/without the wholesalers' labour productivity

	(1) All prefectures	(2) All prefectures without wholesalers' labour productivity	(3) Wholesalers No-Tokyo-Osaka	(4) Wholesalers No-Tokyo-Osaka without wholesalers' labour productivity	(5) Manufacturers Wholesalers No-Tokyo-Osaka	(6) Manufacturers Wholesalers No-Tokyo-Osaka without wholesalers' labour productivity
Dependent variable: Indirect exports (binary)						
Log of distance	-0.0549***	-0.0598***	-0.0755***	-0.0779***	-0.0625***	-0.0650***
	(-104.41)	(-119.84)	(-78.84)	(-83.93)	(-59.80)	(-64.12)
Log of manufacturers' labour productivity	-0.0130***	-0.00638***	-0.00616***	-0.00133	-0.00487**	-0.000161
	(-13.02)	(-6.71)	(-3.96)	(-0.88)	(-2.81)	(-0.10)
Log of wholesalers' labour productivity	0.476***		0.338***		0.332***	
	(531.16)		(229.86)		(203.00)	
Log of the number of clients	0.0854***	0.166***	0.0668***	0.123***	0.0644***	0.122***
	(117.40)	(234.95)	(56.28)	(104.44)	(48.24)	(91.83)
Pseudo R-squared	0.2246	0.1603	0.1694	0.1364	0.1715	0.1390
Number of observations	5727246	5925982	3433952	3510327	2899086	2963691

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 12: Probit estimation for indirect exports, Total Factor Productivity, with/without the wholesalers' total factor productivity

	(1) All prefectures	(2) All prefectures without wholesalers' labour productivity	(3) Wholesalers No-Tokyo-Osaka	(4) Wholesalers No-Tokyo-Osaka without wholesalers' labour productivity	(5) Manufacturers Wholesalers No-Tokyo-Osaka	(6) Manufacturers Wholesalers No-Tokyo-Osaka without wholesalers' labour productivity
Dependent variable: Indirect exports (binary)						
Log of distance	-0.0780***	-0.0919***	-0.173***	-0.181***	-0.157***	-0.165***
	(-11.96)	(-14.46)	(-12.75)	(-13.49)	(-10.31)	(-10.93)
Log of manufacturers' TFP	0.0356	0.0397	0.0380	0.0435	0.0485	0.0509
	(1.16)	(1.33)	(0.80)	(0.93)	(0.85)	(0.90)
Log of wholesalers' TFP	1.092***		0.647***		0.641***	
	(35.12)		(12.35)		(10.56)	
Log of the number of clients	0.156***	0.214***	0.240***	0.286***	0.244***	0.293***
	(14.65)	(20.55)	(13.99)	(16.99)	(12.23)	(14.99)
Pseudo R-squared	0.2787	0.2364	0.2810	0.2685	0.2814	0.2691
Number of observations	26988	26988	14926	14926	11338	11338

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 13: Probit estimation for indirect exports with distance band, labour productivity, total factor productivity

Distance and Number of clients	(1) Labour productivity, All prefectures	(2) Labour productivity, No Tokyo-Osaka	(3) TFP, All prefectures	(4) TFP, No Tokyo-Osaka
Dependent variable: Indirect exports (binary)				
Log of manufacturers' productivity	-0.0154***	-0.00530**	0.0333	0.0496
	(-15.37)	(-3.05)	(1.09)	(0.86)
Log of wholesalers' productivity	0.474***	0.331***	1.082***	0.638***
	(527.65)	(202.09)	(34.70)	(10.48)
Log of the number of clients	0.0852***	0.0635***	0.153***	0.237***
	(117.03)	(47.54)	(14.39)	(11.81)
Distance band 0-25km	0.256***	0.144***	0.654***	1.007***
	(25.25)	(11.35)	(4.11)	(3.78)
Distance band 25-50km	0.262***	0.137***	0.607***	0.969***
	(25.24)	(10.18)	(3.72)	(3.58)
Distance band 50-75km	0.124***	0.00912	0.509**	0.916***
	(11.40)	(0.66)	(3.03)	(3.34)
Distance band 75-100km	0.108***	0.00341	0.553***	0.905***
	(10.03)	(0.25)	(3.30)	(3.33)
Distance band 100-150km	0.0955***	0.0729***	0.485**	0.926***
	(9.33)	(5.92)	(3.02)	(3.54)
Distance band 150-200km	0.0610***	0.0413***	0.649***	1.096***
	(5.90)	(3.35)	(4.03)	(4.20)
Distance band 200-250km	0.0441***	-0.0184	0.466**	0.787**
	(4.28)	(-1.49)	(2.89)	(3.01)
Distance band 250-300km	0.117***	0.0231	0.507**	0.814**
	(11.53)	(1.88)	(3.20)	(3.13)
Distance band 300-400km	0.143***	-0.0505***	0.496**	0.796**
	(14.15)	(-4.17)	(3.12)	(3.07)
Distance band 400-500km	0.122***	-0.0626***	0.445**	0.649*
	(12.02)	(-5.09)	(2.80)	(2.48)
Distance band 500-600km	-0.0393***	-0.144***	0.380*	0.554*
	(-3.78)	(-11.49)	(2.36)	(2.11)
Distance band 600-700km	-0.0892***	-0.166***	0.218	0.612*
	(-8.47)	(-13.14)	(1.34)	(2.32)
Distance band 700-800km	-0.112***	-0.157***	0.00753	0.331
	(-10.09)	(-11.98)	(0.04)	(1.22)
Distance band 800-900km	-0.0132	-0.170***	0.265	0.332
	(-1.26)	(-13.04)	(1.64)	(1.23)
Distance band 900-1000km	-0.0588***	-0.212***	0.162	0.384
	(-5.35)	(-15.71)	(0.96)	(1.41)
Distance band 1000-1500km	-0.204***	-0.174***	-0.0926	0.190
	(-18.80)	(-13.80)	(-0.54)	(0.71)
Pseudo R-squared	0.2267	0.1731	0.2829	0.2905
Number of observations	5727246	2899086	26988	11338

t statistics in parentheses

* p<0.05 ** p<0.01 *** p<0.001

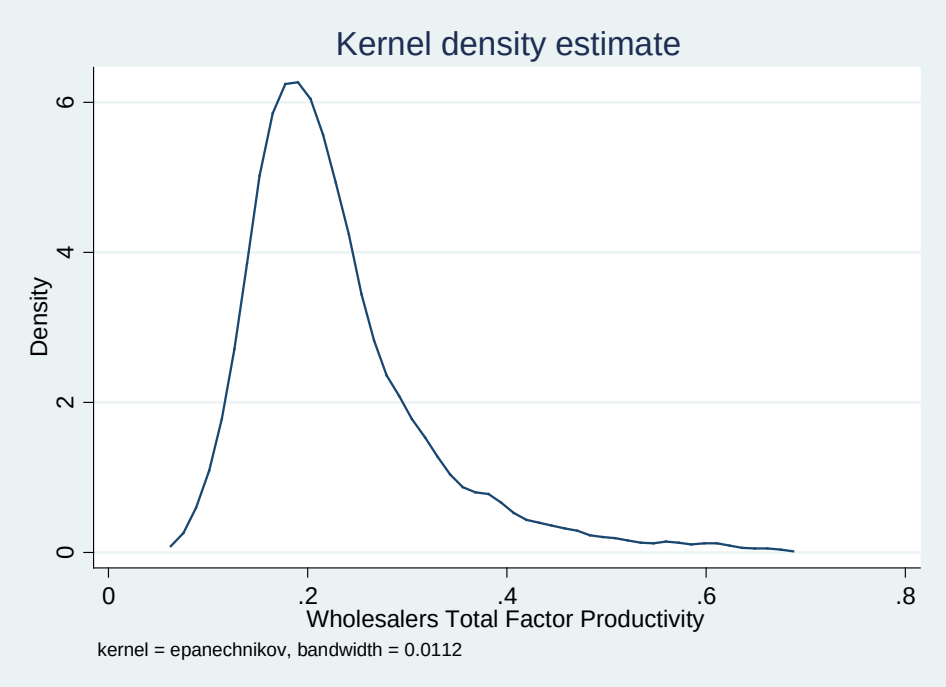
Table 14: Probit estimation for indirect exports with distance band, labour productivity, total factor productivity, single establishment firm

Distance and Number of clients	(1) Labour productivity, All prefectures	(2) Labour productivity, No Tokyo-Osaka	(3) TFP, All prefectures	(4) TFP, No Tokyo-Osaka
Dependent variable: Indirect exports (binary)				
Log of manufacturers' productivity	-0.0163***	-0.00321	0.0495	0.0778
	(-13.86)	(-1.56)	(1.03)	(0.87)
Log of wholesalers' productivity	0.475***	0.331***	1.083***	0.621***
	(460.02)	(176.07)	(24.22)	(7.13)
Log of the number of clients	0.0889***	0.0686***	0.235***	0.296***
	(106.03)	(44.38)	(14.06)	(9.78)
Distance band 0-25km	0.258***	0.153***	0.545*	0.858*
	(21.91)	(10.41)	(2.52)	(2.49)
Distance band 25-50km	0.266***	0.144***	0.630**	0.833*
	(22.13)	(9.23)	(2.85)	(2.37)
Distance band 50-75km	0.119***	0.0207	0.255	0.471
	(9.48)	(1.29)	(1.11)	(1.29)
Distance band 75-100km	0.103***	0.00999	0.552*	0.797*
	(8.24)	(0.63)	(2.44)	(2.25)
Distance band 100-150km	0.0986***	0.0819***	0.378	0.750*
	(8.33)	(5.72)	(1.74)	(2.21)
Distance band 150-200km	0.0661***	0.0397**	0.562*	0.837*
	(5.52)	(2.77)	(2.55)	(2.46)
Distance band 200-250km	0.0451***	-0.0172	0.430*	0.667*
	(3.78)	(-1.19)	(1.97)	(1.97)
Distance band 250-300km	0.125***	0.0268	0.434*	0.653
	(10.61)	(1.88)	(2.01)	(1.94)
Distance band 300-400km	0.141***	-0.0519***	0.425*	0.697*
	(12.05)	(-3.67)	(1.97)	(2.07)
Distance band 400-500km	0.119***	-0.0647***	0.345	0.397
	(10.19)	(-4.51)	(1.60)	(1.16)
Distance band 500-600km	-0.0378**	-0.139***	0.331	0.407
	(-3.14)	(-9.52)	(1.52)	(1.20)
Distance band 600-700km	-0.0965***	-0.167***	0.0658	0.327
	(-7.90)	(-11.31)	(0.29)	(0.94)
Distance band 700-800km	-0.107***	-0.152***	-0.0145	0.258
	(-8.37)	(-9.97)	(-0.06)	(0.73)
Distance band 800-900km	-0.0107	-0.157***	0.252	0.109
	(-0.88)	(-10.41)	(1.15)	(0.31)
Distance band 900-1000km	-0.0776***	-0.216***	0.223	0.331
	(-6.08)	(-13.72)	(0.98)	(0.94)
Distance band 1000-1500km	-0.201***	-0.176***	-0.402	-0.107
	(-16.00)	(-11.97)	(-1.69)	(-0.30)
Pseudo R-squared	0.2256	0.1752	0.2698	0.3043
Number of observations	4327597	2192699	12333	5480

t statistics in parentheses

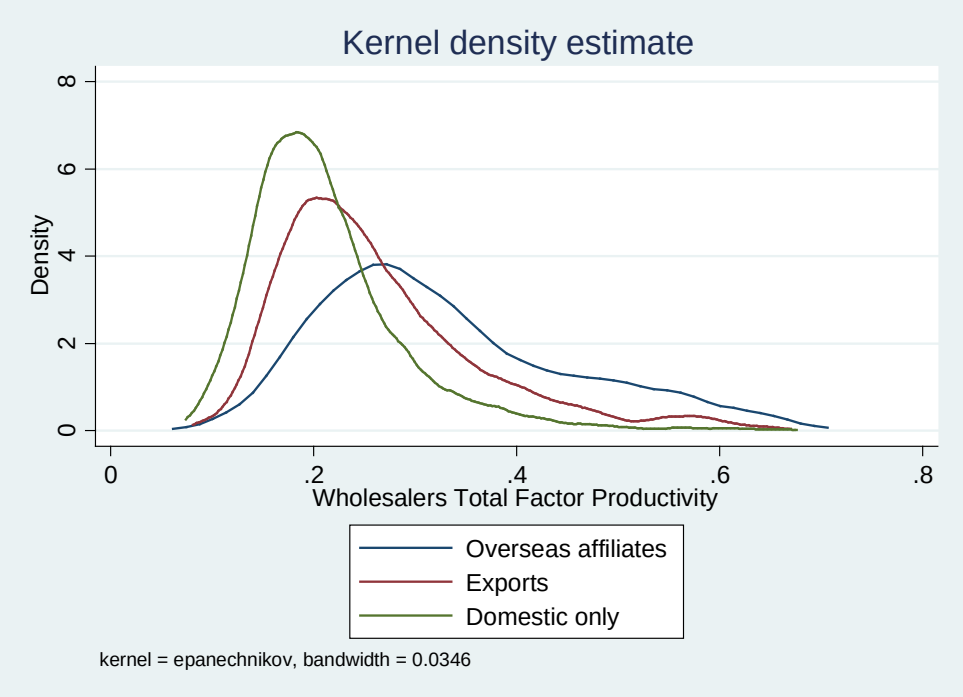
* p<0.05 ** p<0.01 *** p<0.001

Figure 1: Probability density function of Total Factor Productivity of wholesalers computed following the method of Levinsohn and Petrin (2003)



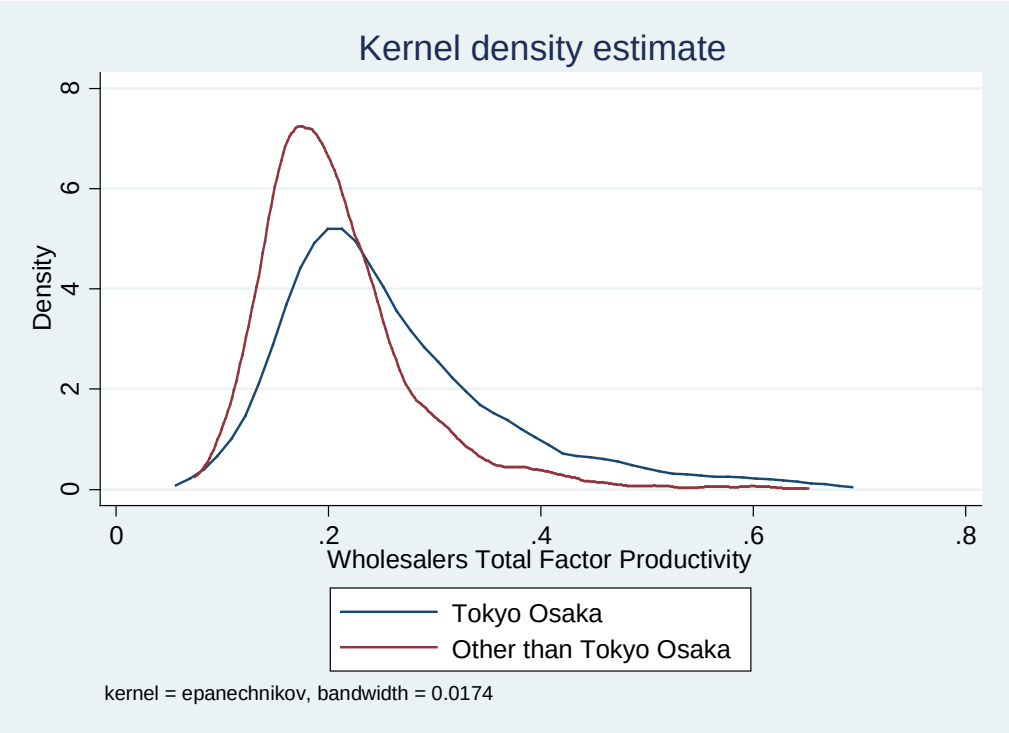
Source: Authors' computation using Basic Survey of Japanese Business Structure and Activities, METI.

Figure 2: TFP distribution a la Levinsohn and Petrin (2003) by overseas activity type



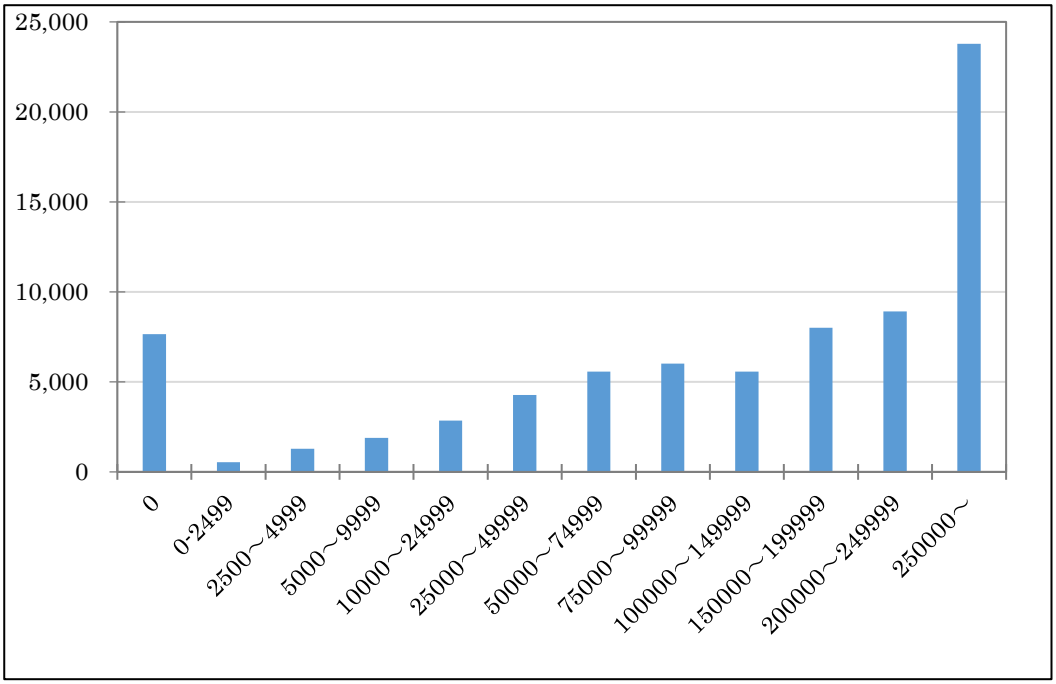
Source: Authors' computation using Basic Survey of Japanese Business Structure and Activities, METI, and Basic Survey on Overseas Business Activities, METI.

Figure 3: TFP distribution a la Levinsohn and Petrin (2003) by locations



Source: Authors' computation using Basic Survey of Japanese Business Structure and Activities, METI.

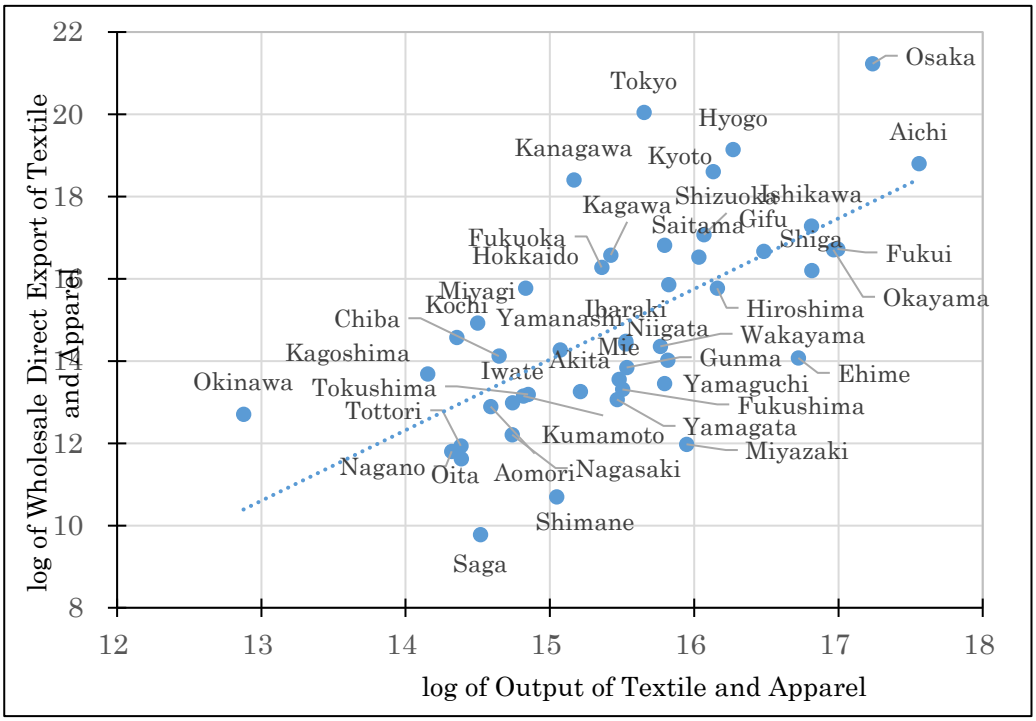
Figure 4: Sales per worker of wholesalers by direct export values



Notes: Unit of sales per worker is Ten Thousand Yen.

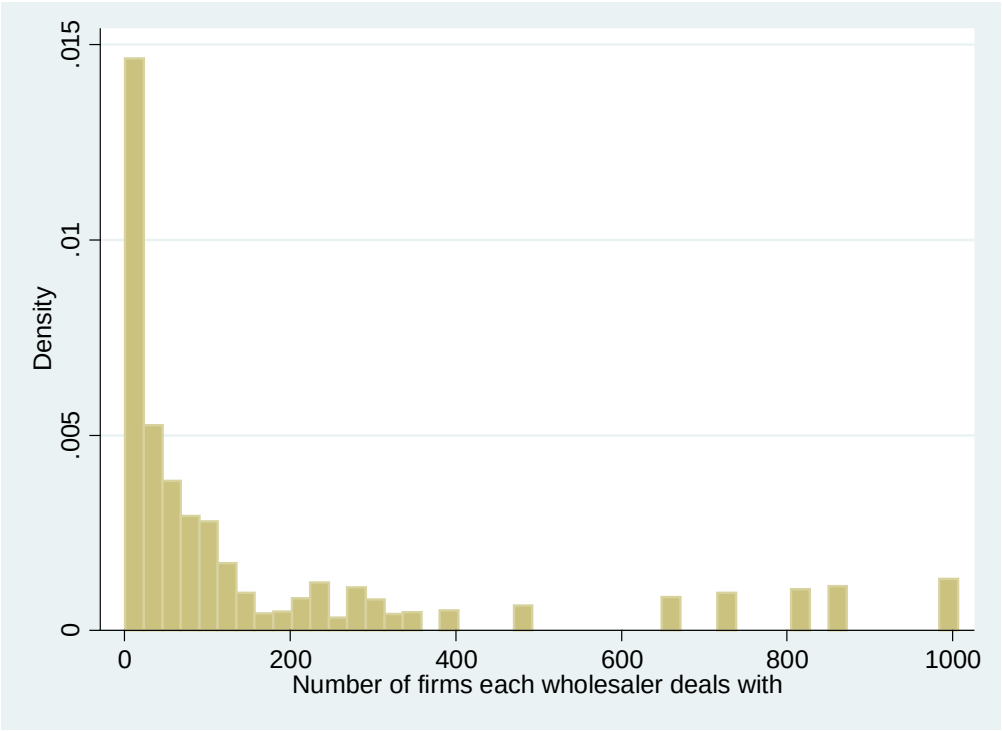
Source: Authors' computation using Census of Commerce, 2014, METI.

Figure 5: Manufacturing Output and Direct Export by Wholesale: Textile and Apparel



Source: Authors' computation using Census of Manufacture, METI, and Census of Commerce, METI.

Figure 6: Number of manufacturing firms from which each wholesaler purchase products



Source: Authors' computation from the Tokyo Shoko Research (TSR) Data.