Features of Japanese Internationalized Firms: Findings Based on Firm-Level Data

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Abstract By using firm-level data on the Japanese manufacturing industry, we examine and compare the characteristics of internationalized Japanese firms, namely firms that engage in exports and/or foreign direct investment (FDI), with those from

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selected European countries. We find that the productivity of internationalized firms is higher than that of domestic firms, thus confirming the findings of previous studies on Japan and other countries. In addition, we show that the productivity differences between domestic firms, exporters, and FDI firms are substantially smaller in Japan than they are in European countries. This finding suggests that productivity differences alone cannot determine the export or FDI behavior of Japanese firms.

Keywords Exports • Foreign direct investment • Productivity • Self-selection

1 Introduction

A number of empirical studies published since the mid-1990s have used firm-level data in order to show that multinational enterprises display distinct characteristics. Since the seminal paper by Bernard and Jensen (1995) in the United States, such studies have found a correlation between export status and firm characteristics. Bernard et al. (2007) summarize the results of the empirical studies on this topic by observing that "exporters have been shown to be larger, more productive, more skill- and capital-intensive, and to pay higher wages than non-exporting firms." Other studies have also confirmed that firms that have relatively high productivity tend to be exporters, including Bernard and Jensen (1999) for the US, Aw et al. (2000) for Taiwan, and Clerides et al. (1998) for Colombia, Mexico, and Morocco.

The productivity of European exporters has also been shown to be higher than that of non-exporting firms. Mayer and Ottaviano (2007) summarize the results of a research project on the relation between firm productivity and degree of internationalization, titled "European Firms and International Markets" (EFIM).[1] They find that the productivity of Europe-based internationalized firms or firms that serve international markets through exports or foreign direct investment (FDI) is higher than that of firms that only serve the domestic market (domestic firms hereafter). Mayer and Ottaviano (2007) call these internationalized firms "the happy few" in reference to Shakespeare's play *Henry V*.

Recent empirical studies such as the above-mentioned that use firm-level data have fostered the development of a new theory of international trade that assumes heterogeneous firms within industries rather than the representative firm assumed in traditional or new trade theory. This new approach was first developed by Melitz (2003), who incorporates heterogeneity in firm productivity into the new trade theory model of Krugman (1980). Melitz's (2003) model predicts that more productive firms engage in exports, while less productive firms serve only the domestic market, since exporting requires additional costs.

[1]EFIM, a research network, was established in 2006. The EFIM research network consists of the Brussels European and Global Economic Laboratory (Bruegel), the Centre for Economic Policy Research (CEPR), and eight research institutes in EU countries. For details, see Mayer and Ottaviano (2007).

Melitz's model has been extended in various directions. In particular, Helpman et al. (2004) examine not only exports but also horizontal FDI. Assuming that the costs of FDI are greater than those of exporting, the authors conclude that the most productive firms engage in FDI, that less productive firms engage in exporting, and that the least productive firms serve only the domestic market. This theoretical prediction is consistent with the empirical results of previous studies such as Mayer and Ottaviano (2007). Moreover, following Antràs (2003), Antràs and Helpman (2004) incorporate incomplete contract theory into the model of Melitz (2003) in order to model various modes of internationalization, such as FDI and offshoring.[2]

Reflecting these developments in theory and empirics, a number of empirical studies have also examined the relationship between firm characteristics and internationalization in Japan. The stylized facts that these studies have presented can be summarized as follows. First, in Japan as elsewhere, highly productive firms become exporters or multinational enterprises through FDI. Studies that have provided clear evidence of the link between firm productivity and export and/or FDI activities include Head and Ries (2001, 2003), Kimura and Kiyota (2006), and Tomiura (2007). Second, research shows that exports and FDI are complementary. Head and Ries (2001), for instance, show that FDI experience positively influences starting export operations, while Kiyota and Urata (2005) find evidence that export experience positively affects FDI. According to Kiyota and Urata (2005), firms that conduct business overseas through FDI account for only 13.8 % of all Japanese firms, but generate 95.1 % of total export value. This finding implies that the vast majority of firms that conduct FDI are also exporters and that exporters also conduct FDI. Third, it has been shown that firm performance improves because of exporting or conducting FDI. Head and Ries (2002) find that FDI to low-income countries contributes to the upgrading of the skill intensity of Japanese firms. Furthermore, Higuchi and Matsuura (2003) show that after performing FDI, Japanese firms' lower employment levels but raise value added and labor productivity. Moreover, Kimura and Kiyota (2006) find that exports and FDI improve total factor productivity (TFP), while Hijzen et al. (2008) show that offshoring, including FDI, stimulates productivity growth. Similarly, Hijzen et al. (2007) find that FDI increases production, employment, and productivity in parent firms.

Against this background, the purpose of this chapter is twofold. First, this chapter employs firm-level data and analyzes a large set of evidence on internationalized firms in Japan, following Mayer and Ottaviano (2007), in order to verify the findings of previous studies. In addition, we use more recent data over a longer period than those employed by previous studies and obtain several new findings. The second purpose is to explore the differences between Japanese and European internationalized firms by comparing our results with those of Mayer and Ottaviano (2007) on European firms. No such systematic comparison has thus far been presented in the literature.

[2]See Helpman (2006) for an excellent survey on trade theory with firm heterogeneity.

For these purposes, we use data on Japanese firms derived from *Kigyo Katsudo Kihon Chosa* (the Basic Survey of Japanese Business Structure and Activities) for 1997–2005. This survey is conducted annually by the Ministry of Economy, Trade, and Industry (METI) and it covers all firms that have employees of 50 or more and capital of 30 million yen or more. The period 1997–2005 is the longest period for which consistent data on exports are available. Although the survey includes firms in the services sector, we focus on manufacturing firms since they play the most significant role in international trade and FDI. In addition, when necessary, we use data on the overseas subsidiaries of Japanese firms compiled from *Kaigai Kigyo Katsudo Kihon Chosa* (the Basic Survey of Overseas Business Activities), also collected annually by the METI. The details of the data used in this chapter are presented in the Appendix.

Our findings confirm those of previous works that the number of internationalized firms in Japan is very small and that export firms are larger and more productive than domestic firms, while those that engage in both exports and FDI are even larger and more productive again. We also show that the characteristics of internationalized firms in Japan are mostly similar to those of their European counterparts. However, we find several notable differences between Japan and Europe, especially that productivity differences between domestic firms, exporting firms, and FDI firms are substantially smaller in Japan than they are in Europe. This finding suggests that variations in productivity alone cannot explain the export and FDI behavior of Japanese firms.

The remainder of this chapter is organized as follows. In Sect. 2, we present the distribution of the exported values of exporters in Japan. Section 3 describes the features of internationalized firms, particularly the performances of internationalized firms compared with domestic firms. Furthermore, we discuss whether higher productivity causes a firm to internationalize (self-selection bias) or vice versa (learning-by-exporting effect). In Sect. 4, we statistically calculate the productivity cut-off for exports and FDI under the assumption of the Pareto distribution of TFP. In addition, by comparing the features of the Pareto distribution and productivity cut-off levels, we investigate heterogeneous internationalization among industries. Finally, Sect. 5 summarizes our findings.

2 Exporters in Japan

2.1 Heterogeneity of Exporting Firms

2.1.1 Dominance of Top Exporters

We start our examination of Japan's export structure by assessing firms' proportions of total exports and manufacturing employment. Beginning with an international comparison, Table 1 shows the percentage of total manufacturing exports accounted

Table 1 Top exporters' share in total exports, manufacturing sector

Country	Top 1 %	Top 5 %	Top 10 %
Japan	62	85	92
Germany	59	81	90
France	44 (68)	73 (88)	84 (94)
United Kingdom	42	69	80
Italy	32	59	72
Hungary	77	91	96
Belgium	48	73	84
Norway	53	81	91
United States			96

Source: The data for Japan are authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*, those for the United States from Bernard et al. (2007), and those for the European countries from Mayer and Ottaviano (2007)

Note: The figures for Japan, France, Germany, Hungary, Italy and the UK are based on large firms only, while those for Belgium, Norway, and the United States cover all firms. The figures in parentheses for France are those for all firms. The figures for the United States are for 2000, while those for all other countries are for 2003

for by the top exporters ranked in terms of their individual exports in each country. We find that in all countries, the top 10 % of exporters are responsible for the overwhelming majority of total export value, although the degree of dominance among the top 1 and top 5 % varies to a larger extent than in the case of the top 10 %. In Japan, the top 1, 5, and 10 % of exporters account for 62, 85, and 92 % of total export value, respectively.

Further, Fig. 1 illustrates the dominance of exporters in terms of exports and number of employees. On the horizontal axis, exporters are ranked in terms of their exports from left to right, while the vertical axis shows their proportions of exports and employment relative to all exporters. The diagonal line indicates that the exports as well as employment rates among the various firms are identical. Therefore, the further away a curve is located from the diagonal line to the top left, the more the distribution is unequally partial. Figure 1 clearly shows that exports and employment are dominated by the top exporters, although the degree of dominance for employment level is smaller than that for exports.

2.1.2 Dominance Over Time

In contrast to the abovementioned observation, the dominance of top exporters has declined somewhat in recent years. Figure 2 shows that between 1997 and 2005, the proportion of total exports accounted for by the leading exporters fell by between

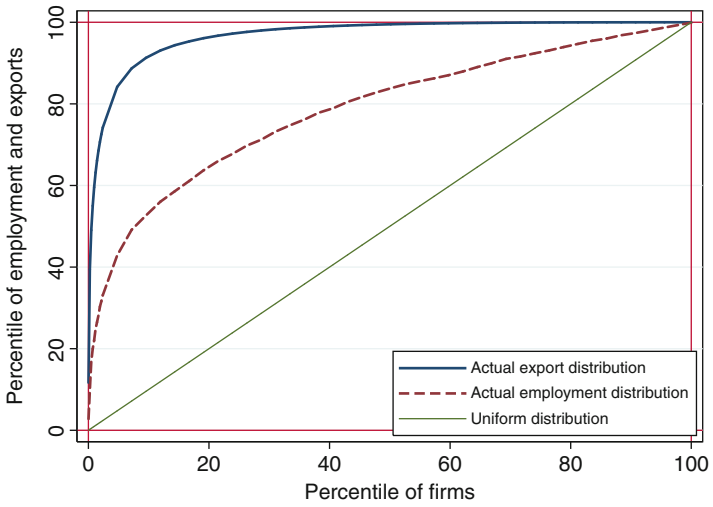
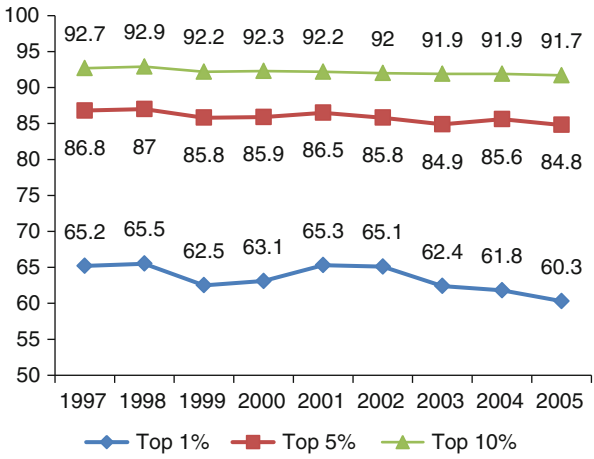


Fig. 1 Top exporters' share in total exports and employment in Japan, 2005. *Note*: The *horizontal axis* shows firms arranged in order of their value of exports (high to low). *Source*: METI, *Basic Survey of Japanese Business Structure and Activities*

Fig. 2 Top exporters' share in total exports: 1997–2005 (Japan, total manufacturing). *Source*: Authors' calculation based on METI, *Basic Survey of Japanese Business Structure and Activities*



1 and 5 % age points. In addition, Fig. 3 presents the change from 1998 to 2004 in the distribution of exporters in terms of their exports. Both figures indicate a slight decline in the dominance of top exporters, suggesting the presence of active new entrants in the export market. However, this declining trend in Japan contrasts with that in France where, according to Mayer and Ottaviano (2007), the dominance of the leading exporters hardly changed from 1998 to 2003.

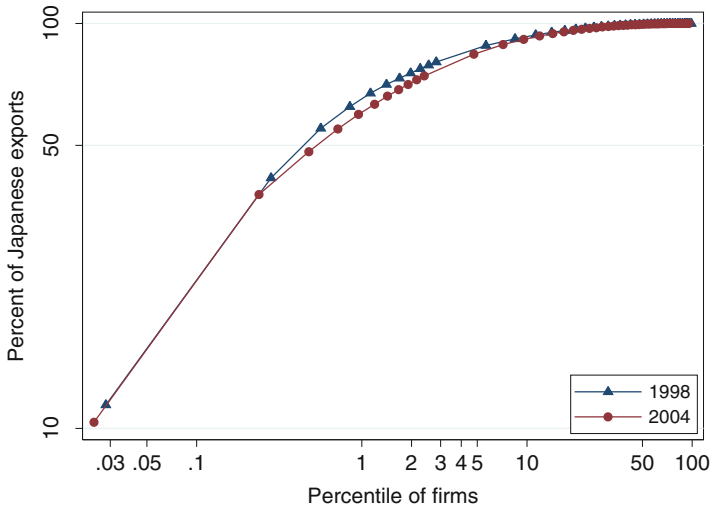


Fig. 3 Top exporters' share in total exports, logarithmic transformation, 1998 and 2004. *Note*: The *horizontal axis* shows firms arranged in order of their value of exports (high to low). *Source*: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

2.2 Export Specialization

2.2.1 Exporters and Export Intensity

The proportion of exporters relative to all firms varies by country. Here, we examine the percentage of firms that export and their export intensity, which is defined as the percentage of turnover that they derive from exports. Table 2 shows the relevant figures for Japan, the US, and selected European countries. These figures indicate that less than one-third of firms (30.5 %) in Japan are engaged in exports, which is lower than in all European countries mentioned in the table except the United Kingdom. The relatively low percentage of exporters in Japan comes as little surprise, however, for two reasons. First, the size of the Japanese domestic market is as large as that in Germany, where exporters also account for a low proportion. Second, Japan shares none of the advantages in terms of geographic, cultural, and linguistic proximity to major trading partners and regional integration that European countries enjoy.

Next, looking at export intensity in the middle columns of Table 2, clear country-level differences can be observed. While the percentage of firms that rely on exports for at least 5 % of their turnover is similar to that for the percentage of firms that export, there are stark differences in the percentage of firms that derive the majority of their turnover from exports. Whereas this figure is only 1.7 % in Japan, it is at least 5 % in six of the studied European countries and more than 20 % in Italy and Hungary. However, 1.7 % of Japanese firms that derive more than 50 % of

Table 2 International comparison of total manufacturing exports and distribution of exports by type of firm, 2003

Country	Number of firms	Total mfg. exports (billion €)	Percent of exporters	Percent of firms exporting more than				Percent of total exports by firms exporting more than			
				5 % of turnover	10 % of turnover	50 % of turnover	90 % of turnover	5 % of turnover	10 % of turnover	50 % of turnover	90 % of turnover
Japan	12,660	318.0	30.5	16.2	11.4	1.7	0.2	98.0	94.8	47.2	2.6
Germany	48,325	488.7	59.3	46.9	40.3	11.9	1.0	99.5	98.5	73.6	6.0
France	23,691	171.7	67.3	41.2	33.0	9.0	1.4	93.6	95.1	49.2	9.7
United Kingdom	14,976	71.5	28.3	22.5	19.3	8.1	1.5	97.6	93.4	65.7	19.0
Italy	4,159	58.6	74.4	64.9	57.4	25.6	2.9	99.7	98.5	69.1	7.5
Hungary	6,404	30.0	47.5	38.4	34.7	22.2	11.0	99.9	99.6	92.0	69.1
Norway	8,125	16.1	39.2	18.0	14.5	5.2	1.3	98.5	97.4	70.3	28.6
United States			18								

Source: The data for Japan are authors' calculations based on METI, Basic Survey of Japanese Business Structure and Activities, those for the United States are from Bernard et al. (2007), and those for the European countries from Mayer and Ottaviano (2007). The figures for Japan, France, Germany, Hungary, Italy and the UK are based on large firms only, while those for Belgium, Norway, and the United States cover all firms. The total manufacturing exports for Japan were converted to euro using the exchange rate released by Japan Customs

their turnover from exports account for a disproportionate 47.2 % of total exports. Nevertheless, this figure is again (considerably) lower than in European countries, indicating a lower degree of export intensity among exporting firms in Japan.

2.2.2 Increasing Amount of Exporting

Table 3 shows that the total value of Japanese firms' exports increased from 34 billion yen in 1997 to 48 billion yen in 2005, while the percentage of firms that export rose from 24.9 to 31.7 % over the same period. In parallel, the proportion of firms who rely on exports for more than 5, 10, and 50 % of their turnover also increased, the latter from 1 % in 1997 to almost 2 % in 2005, meaning that the proportion of total exports accounted for by such firms climbed from 29.3 to 50.4 %.

2.2.3 Industry Comparison

As shown in Table 4, the percentage of manufacturing firms that export relative to all manufacturing firms in 2005 was 31.4 %. However, this overall figure masks wide variations, with the percentage of exporters ranging from less than 10 % in the publishing and printing, wood products, apparel, and food and beverages industries to approximately 50 % or more in the machinery and equipment, chemicals, and precision instruments industries. Meanwhile, those industries that have the largest export intensity are Japan's major export industries, namely the motor vehicles (14.8 %), machinery and equipment (17.3 %), electrical machinery and apparatus (18.7 %), and precision instruments industries (19.1 %). These findings confirm the large discrepancies in the characteristics of exporting firms across manufacturing subsectors in Japan in line with Bernard et al.'s (2007) findings in the US.

3 Characteristics of Internationalized Firms

3.1 Competitive Advantages of Internationalized Firms

3.1.1 Employee, Value Added, Wage, Capital Intensity and Skill Intensity Premiums

In this subsection, we compare the performances of internationalized firms with those of domestic firms. We begin by examining the export (FDI) ratio—measured as the average value of exporters (or firms that invest overseas) relative to the average value of non-exporters (or firms that do not invest overseas)—for a number of indicators, namely employment, value added, wages, capital intensity, and skill

Table 3 Total manufacturing exports and distribution of exports by type of firm, Japan: 1997–2005

Year	Number of firms	Total mfg exports (trillion yen)	Percent of exporters	Percent of firms exporting more than				Percent of total exports by firms exporting more than			
				5 % of turnover	10 % of turnover	50 % of turnover	90 % of turnover	5 % of turnover	10 % of turnover	40 % of turnover	50 % of turnover
1997	14,104	33.99	24.9	11.5	7.8	1.0	0.2	97.3	93.3	54.5	29.3
1998	14,075	34.72	25.2	12.0	8.3	1.1	0.1	97.6	94.4	59.8	40.3
1999	13,861	33.22	26.3	12.6	8.9	1.1	0.1	97.5	94.7	56.0	24.4
2000	13,486	36.91	27.8	13.7	9.5	1.2	0.1	97.4	94.7	56.6	35.1
2001	13,470	35.30	28.8	14.3	10.1	1.4	0.2	97.3	94.5	61.0	49.1
2002	13,158	37.63	29.8	15.4	11.1	1.6	0.1	97.7	94.8	62.0	48.1
2003	12,660	41.55	30.5	16.2	11.4	1.7	0.2	98.0	94.8	64.5	47.2
2004	13,472	40.54	29.5	15.4	11.0	1.6	0.2	97.8	94.6	60.9	47.8
2005	13,203	47.99	31.7	16.9	12.2	1.9	0.2	98.3	94.8	64.8	50.4

Source: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

Table 4 Japanese manufacturing exports by industry, 2005

Industry	Number of firms	Value of exports (100 billion yen)	Percent of exporters	Average ratio of exports to sales
Total manufacturing	13,203	479.95	31.7	13.6
Food products and beverages	1,599	0.96	9.3	4.3
Textiles	281	0.46	22.4	5.9
Wearing apparel	270	0.13	9.3	4.8
Wood and products of wood	142	0.03	9.2	2.7
Furniture	153	0.05	11.8	3.6
Paper and paper products	390	0.32	13.1	5.7
Publishing and printing	827	1.83	7.0	2.7
Leather	29	0.07	31.0	5.4
Rubber products	158	6.31	44.9	12.2
Chemicals and chemical products	930	30.95	52.7	10.4
Coke, refined petroleum and plastic products	759	12.62	31.1	8.4
Other non-metallic mineral products	494	4.43	22.5	11.1
Basic iron and steel	408	3.19	20.1	7.4
Non-ferrous metals	318	8.81	39.9	10.0
Basic metals	988	2.24	26.8	8.8
Machinery and equipment	1,610	71.43	49.6	17.3
Electrical machinery and apparatus	1,986	136.01	41.7	18.7
Motor vehicles	1,155	178.56	36.3	14.8
Precision instruments	380	12.85	61.1	19.1
Other manufacturing	326	8.70	42.6	13.4

Source: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

intensity.[3] Table 5 compares these ratios for Japan with those for a number of European countries. First, it can be seen that the ratios in Japan are greater than one in all cases, demonstrating clear evidence of an export and FDI advantage for Japanese firms. This finding suggests that internationalized firms employ more workers, produce more value added, pay higher wages, and are more capital- and skill-intensive than domestic firms.

Further, the ratios are greater for FDI than they are for exports in a number of countries including Japan. In other words, firms that engage in FDI are larger on average than those that export only. The same pattern also holds for value added. In Japan, for example, FDI firms roughly add nine times more value than non-FDI firms, while exporters add only approximately five times more value than non-exporters. A further observation is that the gap between FDI firms and exporters

[3]We define skill intensity as the number of skilled workers per unskilled worker. Moreover, following previous studies such as Head and Ries (2002), we use nonproduction workers and production workers as proxies for skilled workers and unskilled workers, respectively.

Table 5 Export and FDI premium

Country	Employment premium	Value added premium	Wage premium	Capital intensity premium	Skill intensity premium
Export premium					
Japan	3.02 (3.76)	5.22 (6.06)	1.25 (1.10)	1.29 (1.00)	1.58 (1.30)
Germany	2.99 (4.39)		1.02 (0.06)		
France	2.24 (0.47)	2.68 (0.84)	1.09 (1.12)	1.49 (5.6)	
United Kingdom	1.01 (0.92)	1.29 (1.53)	1.15 (1.39)		
Italy	2.42 (2.06)	2.14 (1.78)	1.07 (1.06)	1.01 (0.45)	1.25 (1.04)
Hungary	5.31 (2.95)	13.53 (23.75)	1.44 (1.63)	0.79 (0.35)	
Belgium	9.16 (13.42)	14.8 (21.12)	1.26 (1.15)	1.04 (3.09)	
Norway	6.11 (5.59)	7.95 (7.48)	1.08 (0.68	1.01 (0.23)	
FDI premium					
Japan	4.79 (8.71)	8.79 (12.52)	1.26 (1.24)	1.53 (1.23)	1.52 (1.52)
Germany	13.19 (2.86)				
France	18.45 (7.14)	22.68 (6.1)	1.13 (0.9)	1.52 (0.72)	
Belgium	16.45 (6.82)	24.65 (11.14)	1.53 (1.2)	1.03 (0.82)	
Norway	8.28 (4.48)	11 (5.41)	1.34 (0.76)	0.87 (0.13)	

Source: For Japan, authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*; for other countries, Mayer and Ottaviano (2007)
Note: Refer to the text for an explanation of how the premia were calculated. Figures in parentheses are the ratio of standard deviations. The figures for Japan, France, Germany, Hungary, Italy and the UK are based on large firms only, while those for Belgium and Norway cover all firms

in terms of the employment and value added premiums is smaller in Japan than it is in European countries. For example, the employment premium for FDI firms in Japan is 18.45 but only 2.24 for exporters, while the equivalent ratios for the value added premium are 22.68 and 2.68 in France. Thus, in France there are substantial differences in the average firm size between firms that conduct FDI and firms that export. Other European countries, with the exception of Norway, show a similar tendency. However, this finding is not the case for Japan in which the employment premium for FDI firms is 4.79 and 3.02 for exporters, while the value added premium is 8.79 and 5.22, respectively.

In addition, we find that both in Japan and in Europe, the wages paid by exporting and FDI firms are higher than their non-exporting or non-FDI counterparts, with the wage premium ranging from 2 % (i.e., a ratio of 1.02, for Germany) to 53 % (for Belgium). With a wage premium of approximately 25 % for both exporters and FDI firms, Japan falls into the middle of this range. Differences in capital and skill intensity may explain these wage differentials. As Table 5 shows, exporting and FDI firms in most countries are indeed more capital-intensive than non-exporting/non-FDI firms. Moreover, exporting and FDI firms in Japan are more skill-intensive than their non-exporting/non-FDI counterparts.

Table 6 Export and FDI premium in Japan (1997–2005)

Year	Employment premium	Value added premium	Wage premium	Capital intensity premium	Skill intensity premium	TFP premium
Export premium						
1997	3.47 (4.10)	4.44 (3.25)	1.20 (1.00)	1.24 (0.82)	1.29 (0.92)	1.20 (0.84)
1998	3.53 (4.23)	4.43 (3.53)	1.20 (1.03)	1.24 (0.79)	1.40 (0.86)	1.16 (1.24)
1999	3.22 (3.34)	4.09 (3.29)	1.19 (1.00)	1.22 (0.80)	1.36 (0.86)	1.17 (1.14)
2000	3.14 (3.59)	4.42 (3.94)	1.20 (1.04)	1.22 (0.84)	1.57 (4.17)	1.21 (1.01)
2001	3.03 (3.50)	4.35 (4.56)	1.21 (1.03)	1.24 (0.88)	1.52 (1.14)	1.16 (0.94)
2002	3.01 (3.41)	4.80 (5.15)	1.23 (1.16)	1.27 (0.88)	1.60 (1.67)	1.23 (1.30)
2003	3.02 (3.76)	5.22 (6.06)	1.25 (1.10)	1.29 (1.00)	1.58 (1.30)	1.32 (1.76)
2004	2.12 (2.27)	2.88 (2.04)	1.20 (1.02)	1.17 (0.79)	1.47 (1.13)	1.34 (1.50)
2005	2.69 (3.21)	4.69 (5.53)	1.25 (1.07)	1.31 (0.91)	1.65 (1.32)	1.38 (1.47)
FDI premium						
1997	5.93 (6.65)	8.96 (7.92)	1.19 (1.05)	1.43 (0.89)	1.20 (1.07)	1.23 (0.92)
1998	5.72 (6.69)	8.16 (6.58)	1.18 (1.07)	1.42 (0.93)	1.31 (0.97)	1.17 (1.18)
1999	5.84 (10.43)	8.69 (10.16)	1.19 (1.04)	1.46 (1.03)	1.28 (0.94)	1.19 (1.10)
2000	5.56 (10.20)	9.00 (9.65)	1.21 (1.20)	1.54 (1.12)	1.65 (4.78)	1.22 (1.13)
2001	5.25 (9.10)	8.30 (7.37)	1.22 (1.17)	1.51 (1.07)	1.47 (1.57)	1.16 (1.00)
2002	5.00 (9.74)	8.90 (15.61)	1.25 (1.33)	1.53 (1.01)	1.51 (1.59)	1.22 (1.17)
2003	4.79 (8.71)	8.79 (12.52)	1.26 (1.24)	1.53 (1.23)	1.52 (1.52)	1.26 (1.06)
2004	4.51 (8.52)	8.12 (11.11)	1.25 (1.20)	1.54 (1.04)	1.59 (1.85)	1.28 (1.31)
2005	4.38 (7.69)	7.57 (8.85)	1.24 (1.17)	1.56 (1.07)	1.58 (1.48)	1.31 (1.47)

Source: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

Note: Refer to the text for an explanation of how the premia were calculated. Figures in parentheses are the ratios of standard deviation

3.1.2 Changes in Premiums Over Time

Table 6 presents the changes in the above-mentioned premiums for exporters and FDI firms from 1997 to 2005 in addition to the trends for TFP premium. While the employee premium of exporting and FDI firms was on a downward trend between 1997 and 2005, the skill intensity of these firms was on an upward trend. These trajectories most likely reflect the overseas transfer or offshoring of production activities and the dominance on skill-intensive head office functions at home.

3.1.3 Productivity Premium

Tables 7 and 8 show the differences in productivity between internationalized and domestic firms for exporters and FDI firms compared with non-exporting or non-FDI firms. Three measures of productivity are shown: apparent labor productivity (ALP), which is defined as revenue per worker, ordinary labor productivity, which is defined as value added per worker, and TFP, which is estimated using the method

Table 7 Export premium by industry, 2005

Industry	Apparent labor productivity	Labor productivity (VA/L)	Estimated TFP (Olley-Pakes)
Total manufacturing	1.34 (1.29)	1.48 (1.38)	1.38 (1.47)
Food products and beverages	1.58 (1.12)	1.66 (1.18)	1.45 (1.28)
Textiles	1.53 (1.68)	1.35 (2.59)	1.24 (1.82)
Wearing apparel	2.00 (1.57)	1.52 (1.25)	1.53 (1.51)
Wood and products of wood	1.11 (1.11)	1.10 (0.38)	1.04 (0.53)
Furniture	1.34 (2.00)	1.32 (1.65)	1.28 (1.75)
Paper and paper products	1.09 (0.85)	1.17 (1.25)	1.10 (1.16)
Publishing and printing	1.38 (1.43)	1.06 (0.93)	1.03 (0.98)
Leather	0.98 (0.77)	1.20 (1.25)	0.98 (0.58)
Rubber products	1.27 (0.90)	1.28 (0.92)	1.22 (1.00)
Chemicals and chemical products	0.88 (0.31)	1.36 (0.53)	1.09 (0.97)
Coke, refined petroleum and plastic products	1.78 (2.37)	1.27 (1.58)	1.19 (1.34)
Other non-metallic mineral products	1.20 (1.14)	1.34 (1.62)	1.24 (1.22)
Basic iron and steel	0.90 (0.61)	1.11 (1.06)	1.00 (0.87)
Non-ferrous metals	1.11 (0.70)	1.31 (1.10)	1.24 (1.00)
Basic metals	1.06 (0.90)	1.28 (0.97)	1.23 (1.00)
Machinery and equipment	1.26 (0.92)	1.21 (0.71)	1.15 (0.75)
Electrical machinery and apparatus	1.52 (1.38)	1.43 (1.24)	1.29 (1.26)
Motor vehicles	1.37 (1.06)	1.28 (1.25)	1.21 (1.21)
Precision instruments	1.16 (1.28)	1.20 (0.94)	1.12 (0.88)
Other manufacturing	1.09 (1.11)	1.11 (1.06)	1.05 (0.99)

Source: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

Note: The firms considered are manufacturers with more than 50 employees. Figures in parentheses are the ratios of standard deviation

of Olley and Pakes (1996). Table 7 shows that in most cases, the productivity of exporters is higher than that of non-exporters. In the manufacturing sector, exporters are between 34 and 48 % more productive, depending on which measure is chosen. These results are qualitatively similar to those obtained by Mayer and Ottaviano (2007) for France, who find that the productivity of exporters in that country is between 15 and 31 % higher than that of non-exporters. The results in Table 8 for FDI firms paint a similar picture. Again, FDI firms are more productive than non-FDI firms in most cases, by 31–44 % on average.

3.2 Productivity Distribution of Firms

We now examine the relative productivity of internationalized firms compared with their domestic counterparts from another angle. Figures 4 and 5 respectively show the distributions of ALP and TFP for the following four types of firms in

Table 8 FDI premium by industry, 2005

Industry	Apparent labor productivity	Labor productivity (VA/L)	Estimated TFP (Olley-Pakes)
Total manufacturing	1.44 (1.28)	1.44 (1.29)	1.31 (1.47)
Food products and beverages	1.66 (1.15)	1.64 (1.41)	1.39 (1.21)
Textiles	1.61 (0.94)	1.28 (0.71)	1.16 (0.85)
Wearing apparel	1.53 (1.24)	1.31 (1.22)	1.20 (1.12)
Wood and products of wood	1.05 (0.67)	1.04 (0.60)	1.02 (0.81)
Furniture	1.46 (1.81)	1.45 (1.71)	1.40 (1.62)
Paper and paper products	1.34 (1.10)	1.22 (0.99)	1.06 (0.71)
Publishing and printing	1.73 (2.28)	1.25 (1.37)	1.10 (0.92)
Leather	1.61 (1.75)	1.37 (1.87)	1.04 (0.76)
Rubber products	1.48 (1.19)	1.29 (0.97)	1.32 (1.13)
Chemicals and chemical products	1.00 (0.35)	1.27 (0.64)	1.05 (0.94)
Coke, refined petroleum and plastic products	1.42 (1.47)	1.18 (1.59)	1.10 (1.27)
Other non-metallic mineral products	1.24 (0.99)	1.29 (0.94)	1.22 (0.75)
Basic iron and steel	0.99 (0.65)	1.27 (1.55)	1.13 (1.24)
Non-ferrous metals	1.22 (0.81)	1.19 (1.11)	1.08 (0.81)
Basic metals	1.22 (1.04)	1.29 (1.11)	1.24 (1.27)
Machinery and equipment	1.39 (1.10)	1.25 (0.85)	1.17 (0.81)
Electrical machinery and apparatus	1.60 (1.45)	1.44 (1.18)	1.30 (1.35)
Motor vehicles	1.44 (1.12)	1.32 (1.25)	1.19 (1.14)
Precision instruments	1.39 (1.79)	1.29 (1.36)	1.19 (1.18)
Other manufacturing	1.39 (1.55)	1.28 (1.68)	1.19 (1.39)

Source: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

Note: The firms considered are manufacturers with more than 50 employees. Figures in parentheses are the ratios of standard deviation

Japan: domestic firms, pure exporters (i.e., firms that only rely on exports to serve overseas markets), pure FDI firms, and export and FDI firms, which are firms that both export and invest abroad. These figures show that the productivity of pure exporters and pure FDI firms is higher than that of domestic firms and that the productivity of export and FDI firms is the highest of all.

To verify whether the differences between these four types of firms are statistically significant, we perform standard t tests for the equality of the mean of the productivity measure between firm types as well as two-sample Kolmogorov–Smirnov tests for the equality of the distribution, following Delgado et al. (2002) and Wagner (2006). The results of the t tests and Kolmogorov–Smirnov tests as well as the descriptive statistics for each of the four types of firms presented in Table 9 indicate that the difference in productivity, measured by either ALP or TFP, between domestic and internationalized firms, between pure exporters and export and FDI firms, and between pure FDI firms and export and FDI firms is statistically significant. These findings are consistent with the theoretical predictions of Melitz (2003) and Helpman et al. (2004) as well as with previous empirical findings.

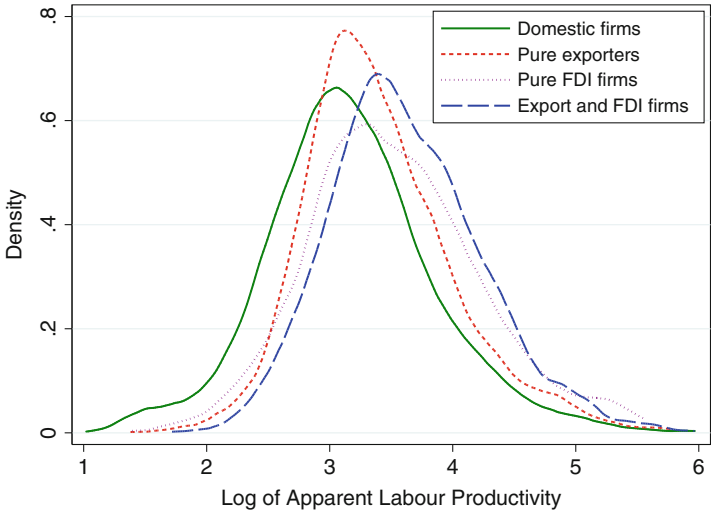


Fig. 4 Productivity distribution of Japanese FDI firms and exporters (APL), 2005. *Source*: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

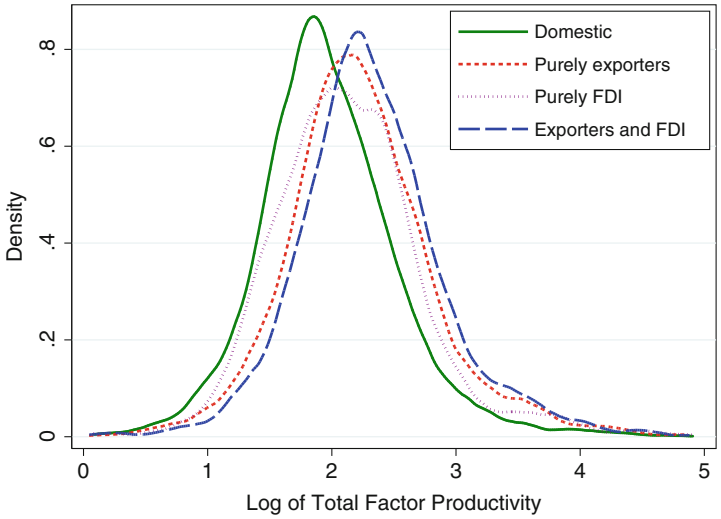


Fig. 5 Productivity distribution of Japanese FDI firms and exporters (TFP), 2005. *Note*: TFP is estimated following the Olley-Pakes method. *Source*: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

However, there is no statistically significant difference in the TFP distribution between pure exporters and pure FDI firms. In the comparison of the productivity distribution of Japanese firms with that of Belgian firms by Mayer and Ottaviano (2007) presented in Fig. 6, the difference in the productivity premium between

Table 9 Productivity distribution in the Japanese manufacturing sector, 2005

		Domestic firms	Exporters	FDI firms	Export and FDI firms	All
Number of firms		8,226	1,872	791	2,314	13,203
Share of each type		62.30	14.18	5.99	17.53	100.00
Log of ALP	Mean	3.17	3.41	3.52	3.63	3.30
	SD	(0.71)	(0.63)	(0.73)	(0.65)	(0.71)
Log of TFP	Mean	1.97	2.23	2.11	2.31	2.08
	SD	(0.59)	(0.63)	(0.67)	(0.65)	(0.63)

		Domestic firms vs. exporters	Exporters vs. FDI firms	FDI firms vs. export and FDI firms	Exporters vs. Export and FDI firms
Log of ALP	Prob-values of t-test	0.00	0.00	0.00	0.00
	Prob-values of KS-test	0.00	0.00	0.00	0.00
Log of TFP	Prob-values of t-test	0.00	1.00	0.00	0.00
	Prob-values of KS-test	0.00	0.99	0.00	0.00

Source: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

Note: ALP stands for apparent labor productivity and is defined as sales per worker. KS-test refers to the two-sample Kolmogorov–Smirnov test. In the t-test, the null hypothesis is that the mean of the first group is equal to the mean of the second group, while the alternative hypothesis is that the mean of the first group is smaller than that of the second group, while in the K–S test, the null hypothesis is that the distributions are equal, while the alternative hypothesis is that the distribution of the second group stochastically dominates the distribution of the first group

Japanese exporters and FDI firms is relatively small. We should interpret this finding with care, however, since the firm size threshold in our dataset may have led to this result. The small difference in the productivity premium in Japan also suggests that the choice of exports or FDI is affected not only by productivity but also by market-specific factors including transport costs for exporting, different fixed costs for exporting and FDI, and host country-specific fixed costs. We should pay attention to this novel finding,[4] especially because the similar productivity level for pure exporters and pure FDI firms is inconsistent with the theoretical prediction of Helpman et al. (2004). Further investigation on this issue would improve our understanding of firms' exporting and FDI behavior.

[4]This is partly because most previous studies do not distinguish between pure FDI firms and export and FDI firms. One exception is Tomiura (2007), who uses a firm-level dataset for Japan taken from a different data source than ours and finds that the productivity of pure exporters is lower on average than that of pure FDI firms. One possible reason for the difference between the findings of Tomiura (2007) and ours is that Tomiura (2007) uses data that incorporates no firm size threshold.

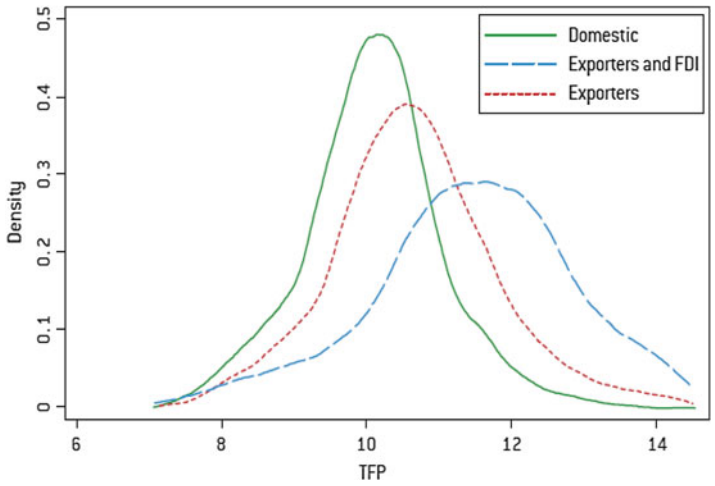


Fig. 6 Productivity distribution of Belgium firms. *Source*: Mayer and Ottaviano (2007), p. 21

Table 10 Percentage of foreign-owned firms among exporters and non-exporters, 2003

Country	Non-exporters	Exporters
Japan	0.7	3.9
Italy	4.0	10.3
Belgium	0.6	12.2
United Kingdom	18.7	27.9
Hungary	11.5	43.6

Source: The data for Japan are from METI, *Basic Survey of Japanese Business Structure and Activities*, while those for the other countries are from Mayer and Ottaviano (2007)

3.3 Exports and Foreign-Owned Firms

Another area of research interest with regard to exporters' characteristics is the role of foreign-owned firms. As shown in Table 10, the proportion of foreign-owned firms is larger among exporters than among non-exporters both in Japan and in Europe. Foreign-owned firms in Japan are defined as firms that have a foreign ownership ratio of 50 % or more (Criscuolo 2005).[5] Notwithstanding the fact that foreign-owned firms by their very nature are more likely to be internationally oriented compared with domestic firms, another reason for the greater internationalization of foreign-owned firms may be that their productivity is higher on average than that of domestic firms.

[5]Note that the foreign ownership cut-off ratio most commonly used in Japan (such as in Japanese government statistics) is 33.3 %. In this chapter, we use the 50 % cut-off ratio for the purposes of international comparison.

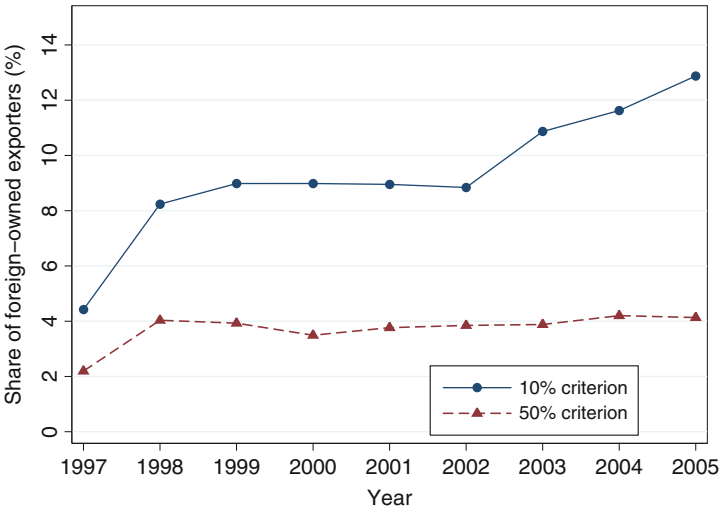


Fig. 7 Foreign ownership of Japanese exporters: 1997–2005. *Source*: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

However, Table 10 shows that the proportion of foreign-owned exporters is substantially lower in Japan than it is in European countries. Figure 7 indicates that the proportion of foreign-owned exporters, when the 50 % cut-off ratio is used to define foreign-owned firms, remained at a low level without any increasing trend between 1997 and 2005. This smaller proportion of foreign-owned firms may be a direct consequence of the fact that the level of FDI inflows toward Japan is substantially low compared with the FDI flows to other developed countries.[6]

3.4 Internationalized Firms' Productivity Advantages: Self-Selection or Learning by Doing?

This subsection examines why the productivity of internationalized firms is higher than that of domestic firms. Two possible explanations offer themselves. The first is the self-selection hypothesis, according to which only high-productivity firms can start to export or conduct FDI because their revenue is sufficiently large to cover the necessary fixed costs. The second explanation is the learning by doing hypothesis, which claims that the productivity of international firms increases through the acquisition of knowledge on foreign markets or the absorption of foreign technology. Bernard and Jensen (1999), among others, have tested these

[6]Please see Fukao and Murakami (2005), Ito and Fukao (2005), and Kimura and Kiyota (2007).

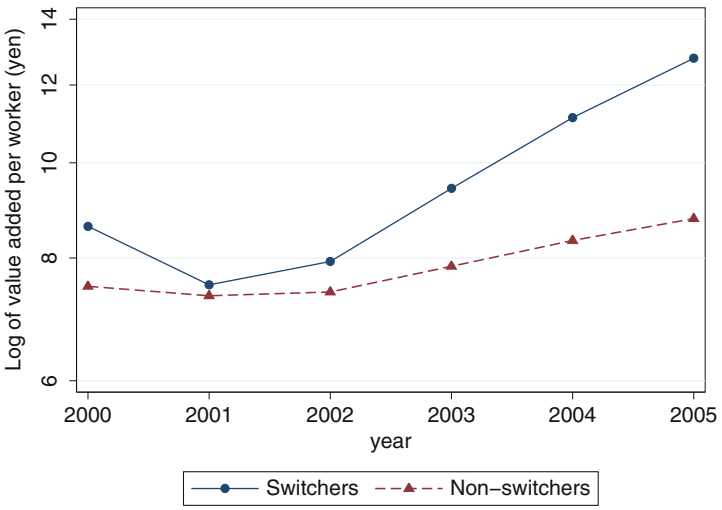


Fig. 8 Comparison of labour productivity performance: Export. *Source*: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

hypotheses.[7] While the self-selection hypothesis finds wide support in the literature, the verdict on the learning-by-doing hypothesis is mixed. Mayer and Ottaviano (2007), for instance, find no clear evidence of the learning-by-doing hypothesis in European countries.

By contrast, studies of Japan have produced evidence that confirms both the self-selection and the learning-by-doing hypotheses. Kimura and Kiyota (2007), for example, found that high-productivity firms are engaged in exports or FDI and that such firms experience a rise in productivity as a result. Hijzen et al. (2008), meanwhile, showed that conducting offshoring, including FDI, contributes to productivity growth at the firm level. Furthermore, Hijzen et al. (2007) find weak evidence that FDI positively influences productivity. All these studies' findings confirm both the self-selection and the learning-by-doing hypotheses.

Against the background of these findings, we reexamine both hypotheses in Japan graphically. We divide firms into switchers and non-switchers, where the former comprise firms that started and continued to export (or conduct FDI) in 2001 and the latter are firms that neither exported nor conducted FDI from 2000 to 2005. The trend of the average of the logarithm of the labor productivity of firms that began exporting in 2001 and those that did not is depicted in Fig. 8.[8] The figure shows that in 2000, namely before they started exporting, the labor productivity of switchers was already higher on average than that of non-switchers. Moreover, the gap in labor productivity between switchers and non-switchers continued to expand from

[7] A summary of such studies is provided by Greenaway and Kneller (2007).

[8] Altogether, 44 firms were switchers, while 3,976 were non-switchers.

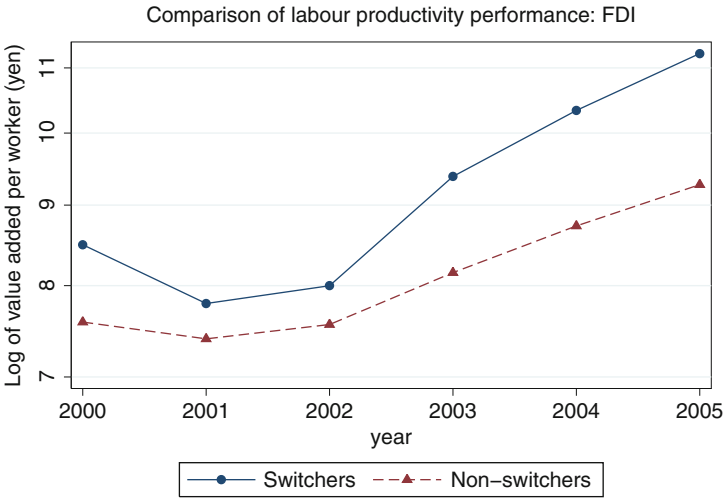


Fig. 9 Comparison of labour productivity performance: FDI. *Source*: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

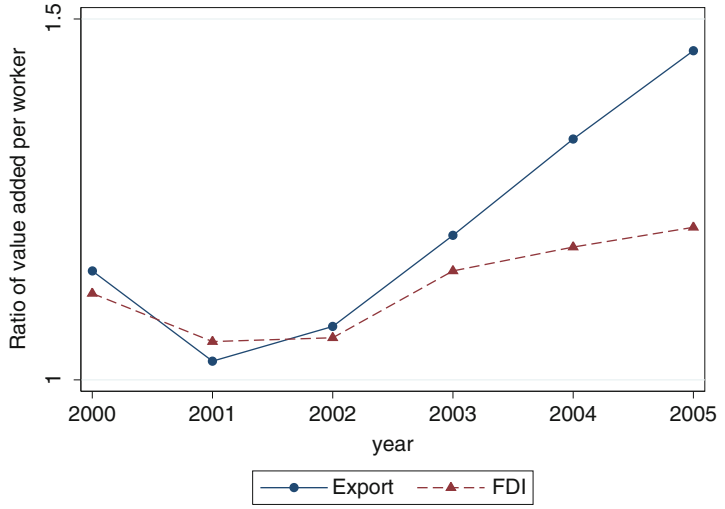


Fig. 10 Comparison of labour productivity performance: Export and FDI. *Source*: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

2001, the year that switchers started exporting. The FDI trend for switchers and non-switchers is shown in Fig. 9[9] and leads to similar conclusions. Figure 10 shows the trend in the ratio of the average value of the labor productivity[10] of switchers

[9]Altogether, 62 firms were switchers, while 4,871 firms were non-switchers.

[10]Labor productivity is defined as value added per worker.

to that of non-switchers. This graph demonstrates that the gap in labor productivity between switchers and non-switchers increased almost continuously from the year that switchers started to export or conduct FDI. The results of the analysis thus confirm those of previous studies of Japan.

4 Productivity Levels for Exporters and FDI-Led Firms

4.1 Productivity Level by Firm

In this subsection, we reexamine how firms' productivity levels differ depending on whether firms engage in exports and/or FDI, assuming a Pareto productivity distribution (see Helpman et al. 2004). Following Mayer and Ottaviano (2007), we estimate the degree of skewness of the Pareto distribution and the productivity cut-offs for exporters and FDI firms.[11] In addition, we examine the variations in the skewness of the productivity distribution by industry.

The cumulative density function for a Pareto distribution is given by

$$F(X) = 1 - \left(\frac{X_m}{X}\right)^k, \tag{1}$$

where X is the TFP level, X_m is the lower bound for the TFP level in the entire sample, and k, or the "Pareto k," indicates the skewness of the distribution. The larger k, the more the probability density curve is skewed to the left and the larger is the proportion of unproductive firms. In other words, a larger k indicates that a fall in the costs of exports and FDI is associated with a larger number of unproductive firms engaging in exports and FDI.

From Eq. (1), we obtain

$$\ln(1 - F(X)) = k\ln(X_m) - k\ln(X). \tag{2}$$

We then regress ln(1 − F(X)) on lnX, using the ordinary least squares (OLS) estimation, in order to estimate k and the intercept as follows:

$$\ln(1 - F(X)) = \widehat{\alpha} + \widehat{\beta}\ln(X) + \varepsilon, \tag{3}$$

where ε denotes an error term. From these estimates, we can estimate k and X_m as follows:

$$\widehat{k} = -\widehat{\beta}, \tag{4}$$

$$\ln(X_m) = \widehat{\alpha}/\widehat{k}. \tag{5}$$

[11] To simplify the presentation, we do not distinguish between pure FDI firms and export and FDI firms in this section.

Table 11 Pareto k and cut-off by industry for Japan

Industry	Pareto k	R-square	Cut-off (lower bound)
Total manufacturing	1.69	0.85	3.94
Food products and beverages	1.63	0.76	3.24
Textiles	1.96	0.80	3.32
Wearing apparel	1.65	0.82	2.46
Wood and products of wood	2.12	0.75	3.31
Furniture	1.87	0.79	3.09
Paper and paper products	2.06	0.84	3.83
Publishing and printing	1.78	0.81	4.08
Leather	1.93	0.91	3.78
Rubber products	2.05	0.85	4.02
Chemicals and chemical products	1.85	0.82	5.28
Coke, refined petroleum and plastic products	1.92	0.75	3.92
Other non-metallic mineral products	1.87	0.77	3.98
Basic iron and steel	2.18	0.86	4.07
Non-ferrous metals	1.78	0.69	3.63
Basic metals	1.62	0.62	3.22
Machinery and equipment	1.99	0.79	4.55
Electrical machinery and apparatus	1.37	0.92	4.67
Motor vehicles	2.20	0.81	4.62
Precision instruments	1.86	0.81	3.96
Other manufacturing	1.67	0.83	4.23

Source: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*
Note: The figures are for 2003

Since the distribution of exporters' TFP also follows a Pareto distribution for which k is equal to the k for the entire sample, we know the relation between the mean of TFP among exporters, X^{EX}, and the lower bound of TFP for exporters, $X_m{}^{EX}$, or the export cut-off is thus:

$$\overline{X}^{EX} = kX_m^{EX} / (k-1). \tag{6}$$

A similar relation can be obtained for FDI firms as follows:

$$\overline{X}^{FDI} = kX_m^{FDI} / (k-1). \tag{7}$$

Finally, from the mean of TFP among exporters and FDI firms and estimated k, we can compute the cut-off for exports and FDI.

We apply the procedures above to our firm-level data on the Japanese manufacturing sector in 2003. The first row of Table 11 indicates the estimated Pareto k, R^2 from the OLS estimation of Eq. (3), and the estimated lower bound for the entire sample, X_m. The R^2, 0.85, suggests that our data fit the Pareto distribution well.

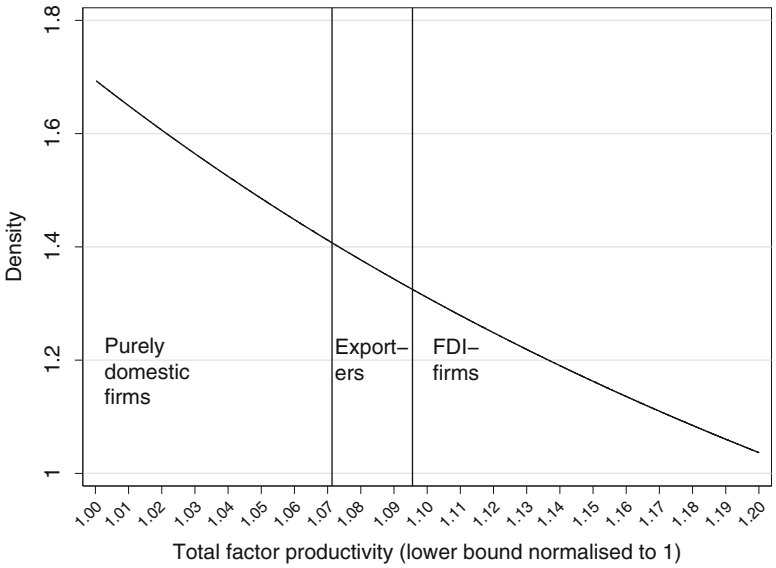


Fig. 11 Distribution of firm productivity. *Note*: TFP distribution, Japan, 2003. Estimation method: Olley-Pakes. *Source*: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

We normalize X_m to one and depict the Pareto distribution of Japanese firms' TFP in Fig. 11, in which the two vertical lines show the cut-off for exporters and FDI firms. This figure confirms that the productivity of FDI firms is higher [i.e., they are to the right of the second vertical line (FDI cut-off)] than that of exporters and that the productivity of exporters is higher than that of domestic firms.

However, we also find several differences between our results for Japan and those for the European countries reported in Mayer and Ottaviano (2007). First, the estimated k is 1.69 for Japan, while they are 3.03 and 2.55 for Italy and France, respectively.[12] As discussed earlier, the smaller k for Japan implies a larger degree of productivity heterogeneity at the firm level. Our results thus indicate that the proportion of productive firms in Japan is relatively large. Second, after normalizing the lower limit of TFP to one, the export and FDI cut-offs are 1.07 and 1.10, respectively, for Japan. These findings suggest that firms that have a TFP level

[12]By eliminating the firms that have an extremely low level of productivity, we can find an OLS fit $P(\ln TFP > x) = -k \ln TFP + b$ with $k = 2.2$. With $k = 2.2$, the export and FDI cut-off TFPs are 1.16 and 1.18, respectively. Hence, this alternative estimation widens the productivity difference between domestic firms and exporters. However, the relatively small productivity difference between exporters and FDI firms remains.

7 and 10 % higher than the lowest TFP level among all firms can export and conduct FDI, respectively. Since the export and FDI cut-offs for Norway reported in Mayer and Ottaviano (2007) are 1.66 and 1.88, respectively, our results suggest that the productivity differences between domestic firms, exporters, and export and FDI firms are relatively small in Japan.[13] This conclusion is consistent with our previous findings (see Fig. 5) that the distributions of TFP among each of the four types of firms substantially overlap, suggesting that productivity differences alone do not determine the export and FDI decisions of Japanese firms and that other major determinants of exports and FDI may exist.

4.2 Productivity Level by Industry

Table 11 shows Pareto k, the lower bound (not normalized), and R^2 by industry, while Fig. 12 provides a scatter diagram of Pareto k and the lower bound for each industry. We see that Pareto k and the lower bound vary considerably by industry. The smaller the value of Pareto k, the larger is the variance and the greater is the proportion of productive firms. In addition, the larger the productivity cut-off, the higher is average productivity. Therefore, the industries plotted at the top right of the diagram demonstrate higher productivity, whereas those that have a large Pareto k but a small productivity cut-off have room to increase their export ratios by raising productivity—even by a small margin. The electrical machinery and chemicals industries show a small Pareto k and high productivity cut-off (i.e., a large proportion of high productivity), while the leather products and textiles industries have a large Pareto k and low productivity cut-off (i.e., a small proportion of high productivity). These findings suggest a high exporters' ratio in the electrical machinery and chemicals industries but a low exporters' ratio in the leather products and textiles industries. In fact, the exporters' ratios are 41.7 % for electrical machinery, 52.7 % for chemicals, 31 % for leather products, and 9.3 % for textiles. How these industries differ in Pareto k and the lower bound of TFP, however, remains a subject to be examined in future research.

5 Conclusion

This chapter examined the characteristics of internationalized firms in Japan and compared such firms with their European counterparts by using firm-level data. Specifically, by using various indicators of firm characteristics such as productivity, value added, employment, and capital and skill intensity, we assessed what

[13]We also find that there is little difference in cut-off productivity between pure exporters and pure FDI firms.

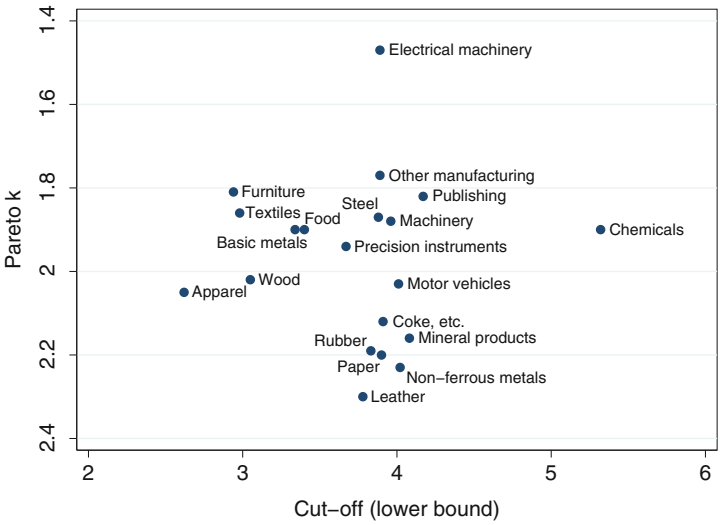


Fig. 12 Pareto k and cut-off for each industry, 2002. *Source*: Authors' calculations based on METI, *Basic Survey of Japanese Business Structure and Activities*

distinguishes internationalized firms in Japan. The main findings of our study can be summarized as follows.

First, our results indicate that firms in Japan are similar to those in Europe in the following respects:

1. Exports are dominated by a few top exporters. The top 10 % of exporters account for more than 90 % of total exports.
2. The export-to-sales ratios of very few firms exceed 50 %. However, these firms account for at least half of total exports.
3. Internationalized firms perform better in terms of a number of the analyzed indicators than domestic firms.
4. The proportion of foreign-owned firms is higher among exporting than among non-exporting firms.
5. The number of FDI firms (extensive margin) has a larger influence on total sales by overseas subsidiaries than sales per firm (intensive margin).

Second, the following features with regard to Japanese internationalized firms are notable:

1. The dominance of exports by the top exporters has weakened over time.
2. The proportion of exporting firms among all manufacturing firms is very low in Japan and—of the countries considered—above only that in the United Kingdom. However, the proportion of exporting firms is rising.
3. Fewer firms have a high export-to-sales ratio in Japan than in Europe.

4. The difference in performance between exporters and FDI firms in Japan is small compared with European countries.
5. The skill intensity of internationalized firms relative to domestic firms is increasing.
6. The proportion of foreign-owned firms among exporters in Japan is much lower than that in European countries.
7. Firms that started to export or conduct FDI had higher productivity prior to doing so than non-export/FDI firms. Moreover, the difference in productivity between these two groups has increased over time.
8. The influence of distance on overseas subsidiary sales is larger for Japanese firms than it is for European firms.
9. The differences in productivity between domestic firms, exporters, and FDI firms are small. This finding suggests that factors other than productivity prevent firms from becoming exporters and/or FDI firms. In particular, the difference between the TFP levels of pure exporters and pure FDI firms is not statistically significant.

Although this study provides a comprehensive picture of Japanese internationalized firms, it has two limitations. First, the results of the study are based on descriptive statistics and simple estimations; we did not use sophisticated econometric methods. Second, this chapter does not deal with offshoring, although Tomiura (2005, 2007), Hijzen et al. (2008), and Wakasugi et al. (2008) analyzed offshoring by Japanese firms. These aspects deserve further study.

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Appendix: Data Sources and Variable Construction

Firm-Level Data

The data on firms' exports and FDI activities as well as the variables used for the calculation of TFP at the firm-level in Sects. 2, 3, and 5 were derived from *Kigyo Katsudo Kihon Chosa* (KKKC) for 1997–2005. This annual national survey conducted by the METI in Japan, which is mandatory for all firms that have 50 or more employees and whose paid-up capital is over 30 million yen, covers the mining, manufacturing, wholesale, retail, and food and beverage industries. We transformed nominal values into real values using appropriate deflators from the Japan Industry Productivity (JIP) Database 2008, which provides comprehensive

data at the three-digit industry level for Japan for 1970–2005. We used KKKC with legal permission, while the JIP database 2008 is downloadable from RIETI (http://www.rieti.go.jp/en/).

Labor Input

Labor input is defined as the total number of employees of all kinds, including full-time employees, part-time employees, and temporarily dispatched workers. We did not adjust the number of employees on the basis of work hours or education level since these data were unavailable.

Value Added

We calculated value added as total sales minus intermediate inputs, that is, the sum of the cost of goods sold and general and administrative expenses minus wages, rental costs, depreciation, and taxes. Total sales and intermediate inputs were deflated using the output and input deflators of the JIP Database 2008, respectively. Since wage payments to temporary workers received from recruitment companies are recorded under outsourcing expenses, which are part of the cost of sales, we defined payments to temporary workers as the average ratio of payments to non-regular employees over regular employees in Japanese manufacturing industries (0.578) multiplied by both the number of temporary workers and the average payments to the regular employees of each firm.

Capital Stock

Real capital stock was calculated by using the perpetual inventory method. While firms report the book values of fixed tangible assets, this is transformed into real values using the ratio of the real values of fixed tangible assets to their book values at the three-digit industry level provided by Tokui et al. (2007). The investment goods deflator used for deflating the value of investment flows and the depreciation rate were also taken from the JIP Database 2008.

TFP

We estimated TFP for each sampled firm by using firm-level data from 1997 to 2005. The direct calculation of TFP using the estimated coefficients of capital stock and labor in the Cobb–Douglas function form suffers from endogeneity. As the

benchmark of TFP, the estimated labor and capital proportions are 0.78 and 0.18, respectively, when estimating the Olley–Pakes production function using investment as a proxy for productivity shocks. We also used an alternative method by employing intermediate inputs or the purchase of inputs as a proxy, as proposed by Levinsohn and Petrin (2003); however, since the results changed greatly by this choice of proxy, we relied on the result of the Olley–Pakes procedure.

Exports and FDI

We used the real value of exports deflated by the output deflator of the JIP Database 2008 and defined exporters as firms that reported positive export values. For FDI firms, we used data from KKKC and defined firms that have at least one subsidiary or affiliate in foreign countries as FDI firms. In the survey, Japanese firms' subsidiaries in foreign countries are defined as overseas firms in which the Japanese parent holds an equity stake of over 50 %, while foreign affiliates are overseas firms in which the Japanese parent holds between 20 and 50 % of the equity. Hence, FDI firms in this study are firms that hold 20 % or more of the equity of an overseas firm.

Sources and Data Construction for Sect. 4

Firm-level variables were derived from the *Kaigai Jigyo Katsudo Kihon Chosa*, an annual survey conducted by the Ministry of Economics and International Trade.[14] The dataset used was a panel and the number of observations was 65,430 affiliate-years (cumulative total from 1995 to 2004).[15]

Country-level variables such as real GDP and exchange rates were derived from the Penn World Tables (PWT6.2). Distance data were taken from Haveman's International Trade Data.[16] Data on WTO membership were constructed based on information provided on the WTO's website.[17]

Sales of FDI firms were constructed as follows. We summed the sales of foreign affiliates recorded in the panel by parent firm and country. Thus, for example, the

[14]The survey covers all Japanese firms that had affiliates abroad as of the end of the fiscal year (March 31). A foreign affiliate of a Japanese firm is defined as a firm that is located in a foreign country in which a Japanese firm had an equity share of 10 % or more.

[15]A more detailed description of the procedure for constructing the panel data can be found in Kiyota et al. (2008).

[16]See http://www.macalester.edu/research/economics/page/haveman/trade.resources/tradedata.html.

[17]See http://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm.

number of firms operating in country i is the number of parent firms that have foreign affiliates in country i rather than the number of foreign affiliates in country i. Average sales were derived by dividing total sales in country i by the number of parent firms.[18]

References

Antràs, P. (2003). Firms, contracts, and trade structure. *Quarterly Journal of Economics, 118*(4), 1375–1418.

Antràs, P., & Helpman, E. (2004). Global sourcing. *Journal of Political Economy, 112*(3), 552–580.

Aw, B., Chung, S., & Roberts, M. J. (2000). Productivity and turnover in the ex ort market: Micro-level evidence from the Republic of Korea and Taiwan (China). *World Bank Economic Review, 14*, 65–90.

Bernard, A. B., & Jensen, J. B. (1995). Exporters, jobs, and wages in U.S. manufacturing: 1976–87. In *Brookings papers on economic activity: Microeconomics* (pp. 67–112).

Bernard, A. B., & Jensen, J. B. (1999). Exceptional exporter performance: Cause, effect, or both? *Journal of International Economics, 47*(1), 1–25.

Bernard, A. B., Jensen, J. B., Redding, S. J., & Schott, P. K. (2007). Firms in international trade. *Journal of Economic Perspectives, 21*(3), 105–130.

Clerides, S., Lach, S., & Tybout, J. (1998). Is learning by exporting important? Micro-dynamic evidence from Columbia, Mexico and Morocco. *Quarterly Journal of Economics, 113*(3), 903–947.

Criscuolo, C. (2005). Foreign affiliates in OECD economies: Presence, performance and contribution to host countries' growth. *OECD Economic Studies, 41*, 109–137.

Delgado, M. A., Farinas, J. C., & Ruano, S. (2002). Firm productivity and export markets: A non-parametric approach. *Journal of International Economics, 57*(2), 2397–2422.

Fukao, K., & Murakami, Y. (2005). Do foreign firms bring greater total factor productivity to Japan? *Journal of the Asia Pacific Economy, 10*(2), 237–254.

Greenaway, D., & Kneller, R. (2007). Firm heterogeneity, exporting and foreign direct investment. *The Economic Journal, 117*, F134–F161.

Head, K., & Ries, J. (2001). Overseas investment and firm exports. *Review of International Economics, 9*(1), 108–122.

Head, K., & Ries, J. (2002). Offshore production and skill upgrading by Japanese manufacturing firms. *Journal of International Economics, 58*, 81–105.

Head, K., & Ries, J. (2003). Heterogeneity and the FDI versus export decision of Japanese manufacturers. *Journal of the Japanese and International Economies, 17*, 448–467.

Helpman, E. (2006). Trade, FDI, and the organization of firms. *Journal of Economic Literature, 44*(3), 589–630.

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

Higuchi, Y., & Matsuura, T. (2003). *Analysis of employment by firm-level panel data* (in Japanese). RIETI Discussion Paper Series, 03-J-019.

Hijzen, A., Inui, T., & Todo, Y. (2007). *The effects of multinational production on domestic performance: Evidence from Japanese firms*. RIETI Discussion Paper Series, 07-E-006.

[18]Because the sales data in the database are recorded in Japanese yen, we converted them into international dollar values using the price level data in PWT6.2. The price level of GDP in PWT, P, is given by $P = 100 \times (PPP / \text{the exchange rate})$. Thus, after conversion into US dollar values, sales data were multiplied by 100 / P.

Hijzen, A., Inui, T., & Todo, Y. (2008). Does offshoring pay? Firm-level evidence from Japan. *Economic Inquiry, 48*(4), 880–895.

Ito, K., & Fukao, K. (2005). Foreign direct investment and trade in Japan: An empirical analysis based on the establishment and enterprise census for 1996. *Journal of the Japanese and International Economies, 19*, 414–455.

Kimura, F., & Kiyota, K. (2006). Exports, FDI, and productivity: Dynamic evidence from Japanese firms. *Review of World Economics, 142*(4), 695–719.

Kimura, F., & Kiyota, K. (2007). Foreign-owned versus domestically-owned firms: Economic performance in Japan. *Review of Development Economics, 11*(1), 31–48.

Kiyota, K., Matsuura, T., Urata, S., & Wei, Y. (2008). Reconsidering the backward vertical linkages of foreign affiliates: Evidence from Japanese multinationals. *World Development, 36*(8), 1398–1414.

Kiyota, K., & Urata, S. (2005). *The role of multinational firms in international trade: The case of Japan*. RIETI Discussion Paper Series, 05-E-012.

Krugman, P. R. (1980). Scale economies, product differentiation, and the pattern of trade. *American Economic Review, 70*(5), 950–959.

Levinsohn, J., & Petrin, A. (2003). Estimating production functions using inputs to control for unobservable. *The Review of Economic Studies, 70*, 317–341.

Mayer, T., & Ottaviano, G. I. P. (2007). *The happy few: The internationalisation of European Firms*. Bruegel Blueprint Series, Bruegel, Brussels.

Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica, 71*(6), 1695–1725.

Olley, G. S., & Pakes, A. (1996). The dynamics of productivity in the telecommunications equipment industry. *Econometrica, 64*(6), 1263–1297.

Tokui, J., Inui, T., & Kim, Y. G. (2007). *Embodied technical progress and the average vintage of capital* (in Japanese). RIETI Discussion Paper Series, 07-J-035.

Tomiura, E. (2005). Foreign outsourcing and firm-level characteristics: Evidence from Japanese manufacturers. *Journal of the Japanese and International Economies, 19*, 255–271.

Tomiura, E. (2007). Foreign outsourcing, exporting, and FDI: A productivity comparison at the firm level. *Journal of International Economics, 72*, 113–127.

Wagner, J. (2006). Exports, foreign direct investment, and productivity: Evidence from German firm level data. *Applied Economics Letters, 13*, 347–349.

Wakasugi, R., Ito, B., & Tomiura, E. (2008). Offshoring and trade in East Asia: A statistical analysis. *Asian Economic Papers, 7*(3), 101–124.

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