RIETI Discussion Paper Series 15-E-030

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RIETI Discussion Paper Series 15-E-030
March 2015

Service Trade and Productivity: Firm-level evidence from Japan*

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Abstract

Studies on the globalization of firm activities have been progressing rapidly, but empirical studies on service trade using firm-level data have been scarce. This paper, using panel data from Japanese firms, analyzes the relationship between service trade and firm characteristics such as productivity and finds the following. 1) The number of firms engaged in service trade is far less than that engaged in goods trade, and the ratio of service trade value to total sales is also small. 2) The share of trade with overseas affiliate firms is larger in service trade than in goods trade. 3) The productivity and wage level of service trading firms are higher than those of domestic firms and goods trading firms. 4) The productivity of firms that export services beyond the boundary of their firm groups is higher than those firms that export services only to their affiliate firms. Collectively, the results suggest that the fixed costs to initiate service trade exceed that to initiate goods trade, thus indicating the potentially important role of policies to liberalize and facilitate service trade.

Keywords: Service trade, Firm size, Productivity, Wage, Affiliate firms, GATS
JEL classifications: F14, F23, D24, L8

* I extend my appreciation to Masahisa Fujita, Yohei Kobayashi, Akira Matsunaga, Atsushi Nakajima, Makoto Ogawa, Tatsuyoshi Okimoto, Ryuhei Wakasugi and the seminar participants at RIETI for their helpful comments and suggestions. Any errors are my own. I am grateful to the Ministry of Economy, Trade and Industry for providing the micro data of the Basic Survey of Japanese Business Structure and Activities employed in this study. This research is supported by the JSPS Grants-in-Aid for Scientific Research (B, 23330101, 26285063).

1. Introduction

Paralleling the growth of the service sector in the economy, service trade is also increasing rapidly. According to the WTO statistics, from 1980 to 2013, world exports of services grew 8.0% per annum, a rate that exceeded the growth rate of world goods exports, which grew at a rate of 7.0% per annum.[1] The ratio of service exports relative to goods exports increased from 18.0% in 1980 to 24.7% in 2013. By country, Japan, in 2013, ranked fourth in goods exports but eighth in service exports, indicating a relatively low presence in world service trade. However, the annual growth rate of Japan's service exports (6.4% from 1980 to 2013) exceeds that of goods exports (5.3%).[2] When considering the composition of service exports of Japan in the 2013 balance of payments (BOP) statistics, the shares of sea transport, charges for the use of intellectual property and other business services exceed 20% of the total service exports. These are followed by travel and construction services (see Appendix Table A1).

Following the rapid depreciation of the Japanese yen in the latter half of 2012 and given that goods exports have not increased simultaneously with this currency depreciation, it is noted that service exports have increased steadily, including a remarkable increase in the number of visitors from foreign countries. According to the BOP statistics, the value of Japan's goods exports in 2014 has increased by 18% since 2011, while the value of service exports has increased by 48%. These figures suggest an increase in the importance of service trade for macroeconomic business cycles.[3]

However, as noted in Francois and Hoekman's (2010) comprehensive survey on service trade, empirical studies on service trade have lagged far behind those on goods trade due mainly to the limited availability of statistical data. Notably, they state that "firm-level datasets are just recently becoming available (for a limited number of countries)." While estimations of gravity-type models and simulations using computable general equilibrium (CGE) models

[1] The figures are calculated from the merchandise trade and the trade in commercial services data taken from the International Trade and Market Access Data (World Trade Organization).

[2] The General Agreement on Trade in Services (GATS) defines service trade as consisting of four modes: 1) direct cross-border trade in services, 2) movement of the customer to the country of the provider, 3) sales of services through an offshore affiliate, and 4) (temporary) movement of (natural) persons to provide services (article 1). However, service trade recorded in the balance of payments (BOP) statistics does not necessarily cover all of the services defined by the GATS. Lipsey (2009) presents a detailed explanation on the various problems associated with measuring service trade.

[3] It is further noted that the BOP statistics in Japan have been substantially revised since January 2014 in accordance with the IMF's Balance of Payments and International Investment Position Manual, sixth edition.

suggest that the liberalization and facilitation of service trade have greater economic effects than do those of goods trade (Francois and Hoekman, 2010), empirical evidence on service trade using firm- or establishment-level micro data has been scarce.

As a majority of services have characteristics such as the simultaneity of production and consumption, the transaction of services generally requires the proximity of supplier and consumer, meaning geographical distance matters more than the transaction of goods—the proximity burden. In addition, cultural and institutional distances may impose an additional burden on service trade. In contrast to goods trade, where tariffs and non-tariff barriers (NTBs) have been substantially reduced through multilateral and bilateral trade negotiations, a large number of services are still subject to public regulations. Furthermore, given that regulations and standards imposed on services differ markedly by country, the barrier to crossing a national border is higher for service trade than it is for goods trade. Van der Marel and Shepherd (2013), for example, estimate a gravity model of trade by using cross-country data and indicate that distance has a larger negative effect on service trade than it does on goods trade. Miroudot *et al.* (2013) present evidence that trade costs in services, in ad valorem terms, are approximately twice as high as those in goods. Anderson *et al.* (2014), who estimate geographic barriers to service trade of Canada with the U.S., find that the border tariff equivalent rates are still exceptionally high—between 52% and 111%.

In recent years, theoretical studies on international trade that focus on the heterogeneity of firms have advanced rapidly (e.g., Melitz, 2003; Bernard *et al.*, 2003; Helpman *et al.*, 2004). Paralleling the theoretical development, a large number of empirical studies on exports/imports and foreign direct investments using firm- or establishment-level data have been conducted. These studies have demonstrated that there is a strong positive relationship between globalizing activity and the size and productivity of the firms. Survey articles on these developments include Greenaway and Kneller (2007), Wagner (2007, 2012), Bernard *et al.* (2012), Hayakawa *et al.* (2012), and De Loecker and Goldberg (2014). Studies on Japanese firms using micro data have also increased since the pioneering works of Kimura and Kiyota (2006) and Tomiura (2007) (see Wakasugi, 2014, for an overview). Through these studies, several empirical regularities have been established, such as the rare participation of firms in international trade and the fact that exporters and importers are larger, more productive, and pay higher wages than do the domestic firms. These facts suggest that large productive firms self-select into international trade, which is consistent with the trade models of heterogeneous firms.[4]

However, the majority of the extant empirical studies that employ micro data have dealt solely with goods trade. While there have been studies on service trade using aggregated data,

[4] Conversely, evidence on the causality of exporting to productivity (learning by exporting) has been mixed (see Wagner, 2012; Hayakawa *et al.*, 2012).

an analysis of service trade at the firm-level is a relatively recent phenomenon.[5] Micro level studies that address both goods trade and service trade include, among others, Vogel (2011), Harris and Li (2012), Temouri *et al.* (2013), and Wagner (2014). However, these studies do not present separate analyses of goods trade and service trade. The few firm-level studies that conduct a separate analysis of service trade are Breinlich and Criscuolo (2011) on UK firms, Kelle *et al.* (2013) on German firms, Haller *et al.* (2014) on firms in four EU countries (Finland, France, Ireland, and Slovenia), and Malchow-Møller *et al.* (forthcoming) on Belgian firms. Among these, the Breinlich and Criscuolo's (2011) study, which is the most notable in this area, presents stylized facts on firms engaging in service trade by using data on exports and imports of UK firms from 2000 to 2005. Specifically, they indicate that service traders are different from non-traders in terms of size and productivity, that firm heterogeneity is a key feature of service trade, and that there are many similarities between service trade and goods trade at the firm-level. They conclude that existing heterogeneous firm models for goods trade is a good starting point for explaining service trade as well.

However, UK firms are exceptional in the world service trade because the UK is the third largest service exporting country, and therefore, the ratio of service exports relative to goods exports is extremely high (54% in 2013). Other studies mentioned herein also analyze firms in EU countries where goods/services market integration is advanced. From the service trade perspective, these countries differ greatly with respect to economic circumstances from Japan or the U.S. To establish more general empirical regularities, it is important to accumulate micro studies of firms other than those of the EU.

Against these backgrounds, this paper, using panel data for Japanese firms from 2009 to 2012, presents empirical facts on the relationship between service trade and firm characteristics in comparison with that of goods trade. According to Breinlich and Criscuolo (2011), the size of service exporters is smaller than that of goods exporters, while the productivity of service exporters is statistically indifferent from that of goods exporters. Haller *et al.* (2014) report labor productivity of service exporters is not necessarily higher than that of goods exporters among four EU countries. However, as previously mentioned, it is natural to expect that geographical, cultural, and institutional distances are more important for service trade than for goods trade. Our first hypothesis is that the effects of firm size and productivity on self-selection into international service trade are stronger than the effects on goods trade.

Under the continuous trend of globalizing firm activities, transactions with foreign subsidiaries and parent firms by multinational firms (intra-firm trade) are increasing. However,

[5] Van der Marel (2012) is an example of an analysis of the relationship between service trade and productivity using industry level aggregated data. Empirical studies on service offshoring deal with importing activity at the firm-level. Ito *et al.* (2008, 2010) and Ito and Tanaka (2010) analyze offshoring of Japanese firms.

the nature of intra-firm trade is substantially different from that of inter-firm trade (e.g., Bernard *et al.* 2012; Irarrazabal, *et al.* 2013). Nonetheless, past studies have not distinguished service trade with affiliate firms from service trade with non-affiliate firms. Given that the data used in this paper, in addition to the total values of service exports/imports and the breakdown values of trade with affiliate firms—service trade within the boundary of their firm groups, are available, we extend the previous literature by examining the differences in firm characteristics between service trade with affiliate firms (intra-firm trade) and with non-affiliate firms (inter-firm trade). As services have distinct characteristics of intangibility, evaluating quality is often difficult, which causes serious information asymmetry. Thus, transaction costs of service trade beyond the boundary of the firm (or firm group) may be higher than those of goods trade. Our second hypothesis is that the size and productivity of service traders with non-affiliate firms is higher than those with only affiliate firms and that the difference is more pronounced in service trade than goods trade.

To preview the results of this paper, first, the number of firms engaged in service trade is far less than the number of firms in goods trade, and the ratio of service trade value to total sales is significantly small. Second, the share of trade with overseas affiliate firms (intra-firm trade) is greater in service trade than in goods trade. Third, productivity and wage level of service trading firms are higher than those of domestic firms and goods trading firms. Fourth, productivity of firms that export services beyond the boundary of their firm groups (inter-firm service exporters) is higher than those firms that export services only to their affiliate firms (intra-firm service exporters). These findings suggest that fixed costs to initiate service trade exceed the fixed costs to initiate goods trade, implying the potentially important role of policies to liberalize and facilitate service trade.

The rest of this paper is structured as follows. Section 2 explains the data used in this paper and the method of analysis. Section 3 reports and interprets the descriptive findings on service trade of Japanese firms and the relationship between service trade and firm characteristics. Section 4 concludes and discusses policy implications.

2. Data and Methodology

This paper uses micro data from the Basic Survey of Japanese Business Structure and Activities (BSJBSA: by the Ministry of Economy, Trade and Industry) for the period 2009 to 2012. The BSJBSA, an annual survey first administered in the fiscal year 1991, has been frequently used in empirical studies on Japanese firms. The BSJBSA provides representative official statistics for all Japanese firms with 50 or more regular employees engaged in mining,

manufacturing, electricity and gas, wholesale, retail, and several service industries.[6] As the BSJBSA is a fundamental statistical survey designated as such by the Statistics Act, firms are obligated to report. Thus, approximately 30,000 firms are surveyed every year. The purpose of the BSJBSA is to capture a comprehensive picture of Japanese firms, including their basic financial information (sales, costs, profits, book value of capital, etc.), the number of employees, ownership structure, the number of (domestic/overseas) establishments, the number of (domestic/overseas) subsidiaries, R&D expenditures, and foreign direct investments. Regarding international trade, exports and imports values have been surveyed since the beginning of the BSJBSA.

Until the fiscal year 2008, only goods trade had been surveyed, but the BSJBSA began collecting information on the value of service trade in fiscal year 2009. Specifically, "exports value (million yen)" and "imports value (million yen)" of "international services transactions other than goods trade" are added as survey items.[7] In addition, exports and imports values with affiliate firms are surveyed as components of the total service transactions. The affiliate firms are defined as the subsidiaries, related firms, and parent firms. [8] International services transactions other than goods trade include transport, telecommunication, construction, insurance, financial, information, software, cultural, and recreational services and royalty of intellectual property rights, and only transactions that appeared in the balance sheet should be reported. This definition of the service trade nearly corresponds to the service trade defined in the BOP statistics. While the data for service trade in the BSJBSA are unique and potentially valuable, a formal empirical study using these data has not yet been conducted.

We construct a panel data set for the fiscal years 2009 to 2012 using perpetual firm identification codes of the BSJBSA. The number of sample firms is 36,596 and the total number of firm-year observations is 119,890.[9] The three-digit industry classification of the BSJBSA has changed frequently in accordance with changes in the Japan Standard Industry Classification (JSIC), but no changes were made between 2009 and 2012. Although we have only four years of observations, continuity in the industrial classification is an advantage in the firm-level panel analysis.

Using this panel data set, we first present descriptive statistics on basic facts about service

[6] Service industries covered in the BSJBSA include credit card and installment finance businesses, eating and drinking services, information services, goods rental and leasing, scientific research, professional and technical services, and living-related and personal services.

[7] However, different from goods trade, disaggregated values by foreign regions and the values by types of services are not surveyed.

[8] A subsidiary is defined as a firm in which a certain firm (parent firm) owns more than 50% of the voting rights. A related firm is a firm in which a certain firm owns no less than 20% but no more than 50% of the voting rights.

[9] The numbers of sample firms by years are 29,096 (2009), 29,570 (2010), 30,647 (2011), and 30,577 (2012).

trade by Japanese firms in comparison with those of goods trade. Specifically, we calculate the number of service traders (exporters/importers) and the ratio of service trade value to total sales by year and industry. We then compare the means and distributions of firm size (log employment), total factor productivity (TFP), and wage level (log of annual wages per employee) between service traders and non-trading (domestic) firms. Similar comparisons are made between service trading firms and goods trading firms. In addition to a simple t-test for significant differences of the means, we test the differences in an overall distribution using the Kolmogorov-Smirnov test. We then divide goods/service traders into firms trading only with their overseas affiliates (intra-firm traders) and firms trading with non-affiliate firms (inter-firm traders) and compare the firm characteristics of these subsamples.

The firm-level TFP is calculated non-parametrically using the cost-share based index number method that employs a hypothetical representative firm as the reference.[10] In this paper, we define hypothetical representative firms by three-digit industries in the first year. The input and output of a hypothetical representative firm in the base year are calculated as the geometric means of all firms in the same industry, and the cost shares of labor and capital are calculated as arithmetic means. The TFP (expressed as a natural log) for each firm in each year is calculated relative to the hypothetical representative firm in the base year. In this calculation, the value-added is the sum of the operating profits, rent, wages, welfare costs, depreciation, and paid taxes. The total hours—labor input—are the sum of the number of full-time employees multiplied by their industry level working hours and the number of part-time employees multiplied by their industry level working hours. The numbers of full-time and part-time employees are taken from the BSJBSA. Data on working hours at the industry level are obtained from the Monthly Labor Survey (Ministry of Health, Labor and Welfare). Data on capital stock are the book value of tangible assets reported in the BSJBSA. The labor cost is the sum of wages and welfare costs, and the capital cost is the value of tangible assets multiplied by the sum of the average bank lending rate and the depreciation rate plus rent for movable and immovable properties. In calculating real (constant price) values of value-added and capital, the GDP deflators of the National Accounts (Cabinet Office) are used.

Next, we perform simple OLS and fixed-effects (FE) regression analyses to explain the productivity and wage level, where firm size (log of the number of employees: *SIZE*) and year dummies are used as basic control variables.[11] In the OLS estimations, three-digit industry

[10] This method of calculating TFP is frequently used in empirical studies on productivity (see, Syverson, 2011) including analysis on the relationship between global activity and productivity. This cost-share-based TFP index number has the advantage of ensuring the cross-section and time-series comparability of firm-level productivity and avoiding problems commonly associated with using restrictive functional forms. The detail of the calculation procedure can be seen, for example, in Kimura and Kiyota (2006), Fukao and Kwon (2006), and Morikawa (2010).

[11] The existence of the learning-by-exporting is also of interest in the studies on the relationship

dummies are added as explanatory variables. The equations to explain the TFP (firm i, industry j, year t) are expressed as follows.

$$TFP_{it} = \alpha + \beta\ TRADER\ DUMMIES_{it} + \gamma\ SIZE_{it} + \varphi_j + \lambda_t + \varepsilon_{it} \quad (1)$$

$$TFP_{it} = \alpha + \beta\ TRADER\ DUMMIES_{it} + \gamma\ SIZE_{it} + \lambda_t + \eta_i + \varepsilon_{it} \quad (2)$$

In these equations, φ_j, λ_t, η_i denote industry dummies, year dummies, and firm fixed-effects, respectively, and ε_{it} is an i.i.d. error term.

The main explanatory variables are the dummies for trading firms (*TRADER DUMMIES*). In the case of analyzing exporter productivity/wage premiums, dummies for goods/service exporters are used, and the reference category is the non-exporting (domestic) firm. When including goods exporter and service exporter dummies simultaneously in the estimation, we classify exporters into 1) the pure goods exporter—an exporter who does not engage in service exports, 2) the pure service exporter—an exporter who does not engage in goods exports, and 3) the goods and service exporter. Our interest in this specification is the order of the productivity/wage premiums by categories. We then divide goods/service exporters into firms exporting only to their overseas affiliates (intra-firm exporters) and firms exporting to non-affiliate firms (inter-firm exporters). We perform similar regressions for goods/service imports, where the non-importing firm is used as the reference category.

When explaining wage level (*lnWAGE*), we add the ratio of part-time workers (*PART*) as an additional control variable because the number of employees—the denominator to calculate average wages—includes part-time employees, which may substantially affect the average wage level. In short, the OLS and FE equations to explain wage level (firm i, industry j, year t) are expressed as follows.

$$lnWAGE_{it} = \alpha + \beta\ TRADER\ DUMMIES_{it} + \gamma\ SIZE_{it} + \delta\ PART + \varphi_j + \lambda_t + \varepsilon_{it} \quad (3)$$

$$lnWAGE_{it} = \alpha + \beta\ TRADER\ DUMMIES_{it} + \gamma\ SIZE_{it} + \delta\ PART + \lambda_t + \eta_i + \varepsilon_{it} \quad (4)$$

As past studies on goods trade have shown that the productivity and wages of trading firms are higher than those of domestic firms (productivity/wage premium), we expect the sign of the coefficients for trading firms (β) to be positive. However, our interest is 1) whether the size of the coefficient for service traders is larger than that for goods traders, and 2) whether the size of

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between trade and productivity. However, this paper does not address this issue, partly because we have short panel data for only four years.

the coefficient is larger for firms trading with non-affiliate firms.

3. Results

3.1. Descriptive Facts on Service Trade

First, we show the number of goods/service exporters by year (Table 1). Among a sample of approximately 30,000 firms, approximately 77% are domestic ones that do not export goods or services (column (2)), approximately 21% of the firms export goods and 6% of firms export services (columns (3) and (4)). Accordingly, it is evident that the number of service exporters is far less than the number of goods exporters. Among service exporting firms, nearly 70% of firms export both goods and services, while the share of pure service exporters that do not export goods is less than 2% of the sample firms (column (5)).[12] By year, the share of goods exporters remains fairly stable, but the share of pure service exporters gradually increases. These patterns are similar for goods/service imports (Appendix Table A2) as the number of service importers is far less than the number of goods importers, and the share of pure service importers is approximately 2% of the sample firms.

Table 2 summarizes the numbers of firms exporting only to their overseas affiliates (intra-firm exporters) and firms exporting to non-affiliate firms (inter-firm exporters). With respect to goods exports, the percentages of intra-firm exporters and inter-firm exporters are 2.8% and 18.7%, respectively. Most of the goods exporters have transactions beyond the boundary of the firm groups. On the other hand, the figures for service exports are 2.8% and 3.1%, respectively, thus indicating that a relatively large number of service exporters do not export services beyond the boundary of the firm groups. Table 3 presents the total values of goods/service exports and the subtotals of inter-firm exports by year. With respect to goods exports, 57.3% of exports are inter-firm exports (column (2)), but only 27.4% of those are service exports. Moreover, more than 70% of service exports are directed to overseas affiliate firm groups (column (4)). Similar tabulation results for imports are presented in Appendix Tables A3 and A4. For both goods and service imports, the shares of imports from non-affiliate firms (inter-firm imports) are greater than those for exports.

Table 4 presents the ratios of goods/service exports values relative to the total sales by year.

[12] When splitting the sample into manufacturing and non-manufacturing firms, the share of goods exporters is, as expected, smaller among non-manufacturing sample. However, unexpectedly, the share of service exporters is higher among manufacturing firms, possibly because manufacturing firms tend to provide transport, construction, and maintenance services or tend to export technology in conjunction with their goods exports and overseas production activities.

The ratio of goods exports is 3.0%, while the ratio of service exports is only 0.13%. When calculating for the subsamples of exporters, however, the ratios become larger, 14.2% and 2.2% for goods and service exports, respectively (columns (2) and (4)). In the case of goods/service imports, while the ratios are similar in size with those of exports, they are gradually increasing (Appendix Table A5). We conjecture that this trend reflects that the Japanese firms have increased intermediate goods/service imports from overseas.

The ratios of the numbers of goods/service exporters by industry are shown in Table 5. As previously mentioned, a relatively large number of manufacturing firms export both goods and services. Among the non-manufacturing firms, the information and communications industry (the ratio of service exporters is 8.5%), the wholesale industry (4.5%), and the service industry (3.3%) exhibit relatively large ratios of service exporters (column (2)). The ratio of pure service exporters (column (3)) is the highest for the information and communications industry (7.7%). The ratios of the numbers of goods/service importers by industry are presented in Appendix Table A6. The rankings by industry are generally similar to those of exports, and the ratios of service importers and pure service importers are the highest for the information and communications industry (12.7% and 11.5%, respectively).

3.2. Size, Productivity, and Wages of Service Trading Firms

In this subsection, we calculate the means and the distributions of firm size (log employment), total factor productivity (TFP), and wages (log of annual wages per employee) of goods/service trading firms and compare them with those of non-trading (domestic) firms.

The mean figures for goods/service exporters are provided in Table 6 with t-test statistics. As expected, both goods exporters and service exporters are larger in size and exhibit higher TFP and wages than non-exporters, and all of the differences are statistically significant at the 1% level. It is further noted that the quantitative differences relative to non-exporters are larger for service exporters than for goods exporters. In terms of firm size, goods exporters and service exporters are 28.5 log points (33.0%) and 69.0 log points (99.3%) larger than non-exporters, respectively (panel A of Table 6).[13] Exporters' productivity premiums are 18.3 log points (20.1%) for goods exporters and 24.8 log points (28.2%) for service exporters (panel B). Wage premiums are 24.6 log points (27.9%) for goods exporters and 32.6 log points (38.6%) for service exporters (panel C). While not indicated in the table, differences between goods and service exporting firms are statistically significant at the 1% level with service exporters being

[13] Throughout this paper, percentage differences of x log points are calculated as exp(x)-1.

larger, more productive, and paying higher wages relative to goods exporters.[14] Similarly, when comparing pure goods exporters and pure service exporters, productivity and wages of the latter are far higher than those of the former.[15]

The distributions (kernel density) of the TFP for domestic firms, goods exporters, and service exporters are presented in Figure 1. It is evident from this presentation that the productivity distributions of goods/service exporters are higher than those of domestic firms and that the productivity distribution of service exporters is higher than that of goods exporters. When applying the Kolmogorov-Smirnov test, the distributions are significantly different at the 1% level. While not presented as figures, similar results are obtained for the distributions of firm size and wage level, thus indicating that the mean differences between service exporters and domestic firms or goods exporters are not caused by a small number of exceptionally high performers, but rather that the overall distributions of service exporters are higher. Figure 2 presents productivity distributions by further disaggregating the sample into non-exporters (domestic firms), pure goods exporters, pure service exporters, and firms exporting both goods and services. The pure service exporters' productivity distribution is not only higher than that of non-exporters but also higher than that of pure goods exporters. Again, the distributions are significantly different at the 1% level according to the Kolmogorov-Smirnov test.

These results differ from the findings of past studies, such as Breinlich and Criscuolo (2011) and Haller *et al.* (2014). According to Breinlich and Criscuolo (2011), pure service exporters in the UK are smaller than pure goods exporters, though the productivity differences of these two groups are small and statistically insignificant. Haller *et al.* (2014) find that labor productivity of pure service exporters in four EU countries is not necessarily higher than that of pure goods exporters. As discussed in the introduction, in comparison with EU countries, the development of service trade by Japanese firms is lagging. We interpret the above results to suggest that only large and productive firms can engages in service trade due to geographical, linguistic, and institutional distances from foreign countries. The results from firms in European countries are not necessarily applicable to firms outside of Europe.

We divide goods/service trading firms into firms trading only with their overseas affiliates (intra-firm traders) and firms trading with non-affiliate firms (inter-firm traders), and we then test the differences in firm characteristics between the subsamples. Table 7 summarizes the results for exports. In both goods and service exports, firms exporting to non-affiliate firms (inter-firm exporters) are generally larger, more productive, and higher paying than firms exporting only to their foreign affiliates (intra-firm exporters). Furthermore, the differences in

[14] When using only the sample of non-manufacturing firms, the results are essentially unchanged.
[15] As explained herein, firms exporting both goods and services exhibit the largest size and the highest productivity and wages.

size and productivity between inter-firm traders and intra-firm traders are quantitatively larger among service exporters than among goods exporters (column (3)), although the results are the opposite with respect to average wages. With respect to productivity, the TFP premium of inter-firm exporters is positive but small (1.2 log points) and insignificant among goods exporters, but the inter-firm TFP premium among service exporters is 3.4 log points (3.4%) and statistically significant at the 1% level (panel B of Table 7).

Figure 3 presents the TFP distributions (kernel density) for the inter-firm and intra-firm service exporters. The TFP distribution of inter-firm service exporters is higher than that of intra-firm service exporters. We confirm the difference using the Kolmogorov-Smirnov test and find that all of the distributions are significantly different at the 1% level. These results suggest that firms that export services beyond the boundary of the firms must overcome relatively challenging obstacles.

Comparisons between goods/service importers and non-importers are shown in Appendix Tables A7 and A8. The rank orders in size, productivity, and wages among non-importers, goods importers, and service importers are similar to the findings for exports (Appendix Table A7). Focusing on productivity, we find the mean TFPs of the goods importers and service importers are 16.2 log points (17.6%) and 28.6 log points (33.1%) higher than those of non-importers, respectively. However, the differences between firms importing from non-affiliate firms (inter-firm importers) and firms importing only from their foreign affiliates (intra-firm importers) are not as clear as they are when comparing types of exporters (Appendix Table A8). In particular, the results for productivity differences are the reverse of those for goods/service exports. That is, the TFP levels of inter-firm importers are lower than those of intra-firm importers, and the difference is statistically significant for service importers (column (2) of Appendix Table A8). Our speculation is that intra-firm importers are the efficient global firms that have established international production and distribution networks through direct investments. In the case of service imports, the boundary of firms is not a hurdle for importing Japanese firms. Of course, we do not deny the possibility that the barrier to export services to Japanese firms is high for service exporters in foreign countries.

3.3. Regression Results

The results in the previous subsection are the simple comparisons of the firm characteristics of trading firms. In this subsection, we report regression results of the equations (1) to (4) as explained in Section 2. Table 8 indicates exporter productivity/wage premiums after adjusting for the control variables. Pooling OLS and fixed-effects estimation results are reported in panels

A and B, respectively.

According to the OLS results, both productivity and wages of goods/service exporters are higher than those of non-exporters and the differences are statistically significant at the 1% level after controlling for firm size and three-digit industries (panel A, columns (1), (2), (4), and (5)). The results indicate that the productivity/wage premiums of exporters are not only due to their larger size and their difference in industry, and the size of the coefficient for service exporters is greater than that for goods exporters. In the OLS estimations, the productivity premiums of the service exporters is 18.7 log points (20.6%), while that of the goods exporters is 14.1 log points (15.2%). The wage premiums for goods exporters and service exporters are 11.5 log points (12.2%) and 17.4 log points (19.0%), respectively. As our data do not have detailed information about the characteristics of the workforce, such as education, the measured premiums include differences in the skill-mix of the workforce.

In these regressions, dummies for goods exporters and service exporters include firms exporting both goods and services. Columns (3) and (6) of Table 8 show the regression results by splitting exporting firms into pure goods exporters, pure service exporters, and both goods and service exporters. According to the OLS results, the estimated coefficients for the exporter dummies are all positive and significant and the rank orders of the size of the coefficients are consistent with the figures reported in the previous subsection. In the case of OLS productivity regression, the TFP premiums for pure goods exporters, pure service exporters, and goods and service exporters are 13.0 log points (13.8%), 18.2 log points (19.9%), and 19.3 log points (21.3%), respectively (panel A, column (3)). The results for average wages show a similar pattern as the average wages of pure goods exporters, pure service exporters, and goods and service exporters are 10.3 log points (10.8%), 15.8 log points (17.1%), and 17.4 log points (19.0%) greater than those of non-exporters (see panel A, column (6)). These results confirm the finding in the previous subsection regarding the relatively higher productivity and wage level of service exporters.

Panel B of the table shows the fixed-effects estimation results. The coefficients for the goods/service exporters are all positive and significant at the 1% or 5% level (columns (1), (2), (3), and (4)), but the size of the coefficients are far smaller than those identified by the OLS estimates. For example, the TFP premiums of goods exporters and service exporters are both approximately 4%, which are approximately one-fourth of the OLS estimates. When splitting exporters into the pure goods exporters, pure service exporters, and goods and service exporters, the coefficients for the pure service exporters are positive but statistically insignificant (see columns (4) and (6), panel B of Table8).[16] These fixed-effects estimation results indicate that a

[16] Among the exporting firms, the share of exporting firms that did not export in the previous year is approximately 8% in goods exports, but approximately 24% in service exports. This means that a

large portion of goods/service exporters' productivity/wage premiums found in the OLS estimates is the result mainly of unobservable firm characteristics. In other words, most of the exporters' productivity premiums are the results of productive firms' self-selection into exporting. Of course, in the cases where the fixed-effects coefficients for exporters are positive and significant, the possibility of learning-by-exporting cannot be eliminated.[17] The difference between the OLS coefficients and the fixed-effects coefficients is generally greater for service exports than for goods exports, suggesting that the causality running from firm productivity to exporting is stronger for service exports than for goods exports.

The regression results for goods/service imports are reported in Appendix Table A9. The results regarding the sign and the size of the coefficients are generally similar to the results for exports. The productivity and wages of the firms importing services are higher than the non-importing firms and goods importing firms in the OLS estimates. However, in the fixed-effects estimations, the productivity/wage premiums of service importers become small and sometimes lose statistical significance.

Finally, we perform regressions by splitting goods/service exporters into firms exporting only to their overseas affiliates (intra-firm exporters) and firms exporting to non-affiliate firms (inter-firm exporters). The results are reported in Table 9. According to the OLS estimates to explain the TFP (columns (1) to (3) of panel A), the coefficients for inter-firm exporters are larger than those for intra-firm exporters for both goods and service exports. The difference in the size of the coefficients between inter-firm and intra-firm exporters is greater in service trade than in goods trade. These results are consistent with the simple comparisons reported in the previous subsection. However, while statistically significant, the size of the coefficients for goods/service exporter dummies is small in the fixed-effects estimations (columns (1) to (3) of panel B). These results suggest that highly productive firms tend to self-select into service exporting beyond the boundary of the firms. On the other hand, in the OLS equations to explain the average wages, the wage premiums for inter-firm service exporters relative to intra-firm service exporters are not as remarkable (columns (4) to (6) of Table 9), and the coefficients for the inter-firm service exporters are insignificant.

The regression results for the intra-firm and inter-firm importers are reported in Appendix Table A10. The pattern is generally similar to the exports. However, in the OLS estimations on the relationship between productivity and service imports, the TFP level of intra-firm importers

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relatively large number of service exporting firms intermittently export services with foreign firms. As a result, the coefficients may become small in the fixed-effects estimations. The pattern of importing is similar as service importing firms have a tendency to not import services continuously.

[17] We cannot interpret the fixed-effects results as evidence of a learning-by-exporting. To test the learning-by-exporting hypothesis, an analysis on the effects of starting/stopping exports caused by an exogenous factor, for example, is necessary.

is higher than that of inter-firm importers. This result confirms the findings from simple comparisons in the previous subsection, suggesting that firms with service imports from their foreign affiliates are efficient multinational firms that have established international production and distribution networks through direct investments.

4. Conclusion

Japan has long been regarded as a large exporter of manufactured goods, but the level of its service trade is lower than other advanced countries. However, this situation is gradually changing as the presence of the service industries in the industrial structure is increasing steadily and the growth rate of service exports is exceeding that of goods exports. Recent literature on international trade has paid special attention to the heterogeneity of firms and has found various empirical regularities, such as a strong positive relationship between globalizing activity and firm productivity. However, micro level empirical studies on service trade have been scant. Against these backgrounds, this paper, using a large panel data for Japanese firms from 2009 to 2012, presents evidence on the relationship between service trade and firm characteristics, such as size and productivity.

According to the analysis, the differences between service traders and non-traders are more pronounced than the differences observed in goods trade. The number of firms engaged in service trade is far fewer than those engaged in goods trade, while the productivity and wages of service trading firms are higher than are those of domestic firms and goods trading firms. These findings are consistent with the trade models stressing firm heterogeneity (e.g., Melitz, 2003). A limited number of past studies that have employed micro data on service trade in European countries have indicated that service traders are not larger than goods traders and that the productivity of service traders is not necessarily higher than that of goods traders. However, the productivity of the Japanese service traders is clearly higher than that of goods traders.

Furthermore, we extend the previous literature by examining the differences between intra-firm traders and inter-firm traders. Among trading firms, the share of intra-firm service trade is far greater than that of goods trade. In addition, the productivity of firms that export services beyond the boundary of their firm groups is higher than those that export only to their affiliate firms.

Taken together, these findings suggest that fixed costs to initiate service trade exceed the fixed costs to initiate goods trade. This is possible due to the information asymmetry in evaluating the quality of services, the high transportation costs, and the differences in institutions and languages. In other words, trade policies to liberalize and to facilitate service

trade through GATS and EPAs may play a more important role in globalizing firm activities than do policies for goods trade.

As the purpose of this paper is simply to present descriptive evidence on service trade of Japanese firms, we do not conduct a dynamic analysis, such as testing the learning-by-exporting hypothesis. However, because the effects of international trade on firm performance are important issues from the perspective of policy planning, we intend to address this issue in a future study. Although the micro data used in this paper are unique and valuable, we note the limitations of the data for service trade by destination/origin countries and disaggregated by types of services are still lacking.

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Tables and Figures

Table 1 The number and the ratio of goods/service exporters

	(1) Sample	(2) Non-exporter		(3) Goods exporter		(4) Service exporter		(5) Pure service exporter	
2009	29,096	22,467	77.2%	6,169	21.2%	1,551	5.3%	460	1.6%
2010	29,570	22,630	76.5%	6,404	21.7%	1,751	5.9%	536	1.8%
2011	30,647	23,527	76.8%	6,503	21.2%	1,870	6.1%	617	2.0%
2012	30,577	23,320	76.3%	6,630	21.7%	1,907	6.2%	627	2.1%
Total	119,890	91,944	76.7%	25,708	21.4%	7,079	5.9%	2,240	1.9%

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012. Pure service exporter is the firm exports services, but it does not export goods.

Table 2 The number of intra- and inter-firm exporters

	Number of the sample	(%)
Goods exporter	25,708	21.4%
Intra-firm exporter	3,304	2.8%
Inter-firm exporter	22,404	18.7%
Service exporter	7,079	5.9%
Intra-firm exporter	3,409	2.8%
Inter-firm exporter	3,670	3.1%
Total	119,890	

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012. Intra-firm exporter is the firm exporting only to foreign affiliate firms. Inter-firm exporter is the firm exporting to non-affiliate firms.

Table 3 The value of goods/services exports (trillion yen, %)

	(1) Goods exports	(2) Inter-firm goods exports		(3) Service exports	(4) Inter-firm service exports	
2009	63.3	36.7	58.0%	2.5	0.8	30.5%
2010	72.3	41.7	57.7%	2.9	0.9	32.0%
2011	69.2	41.5	60.0%	2.4	0.6	25.8%
2012	69.0	37.2	53.9%	2.9	0.6	21.8%
Total	274.0	157.0	57.3%	10.8	3.0	27.4%

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012.

Table 4 The ratio of exports value to total sales

	(1) Goods exports (all firms)	(2) Goods exporters only	(3) Service exports (all firms)	(4) Service exporters only
2009	3.0%	14.3%	0.11%	2.15%
2010	3.1%	14.2%	0.14%	2.33%
2011	3.0%	14.2%	0.14%	2.27%
2012	3.1%	14.2%	0.14%	2.17%
Total	3.0%	14.2%	0.13%	2.23%

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012.

Table 5 The share of goods/service exporters by industry

	(1) Goods exporter	(2) Service exporter	(3) Pure service exporter	(4) Sample
Manufacturing	34.3%	8.5%	1.3%	52,755
Electricity & gas	1.5%	0.6%	0.6%	536
Wholesale	26.0%	4.5%	1.2%	23,018
Retail	3.7%	0.8%	0.4%	14,238
Information & communication	2.9%	8.5%	7.7%	9,776
Service	3.7%	3.3%	2.4%	16,494
Others	5.5%	3.0%	1.5%	3,073
Total	21.4%	5.9%	1.9%	119,890

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012. Pure service exporter is the firm exports services, but it does not export goods.

Table 6 Comparison of goods/service exporters and non-exporters

		Diff.	(%)	
A. Firm size (log employees)				
Non-exporter	5.1671			
Goods exporter	5.4524	0.2853	33.0%	***
Service exporter	5.8567	0.6896	99.3%	***
B. TFP				
Non-exporter	-0.0411			
Goods exporter	0.1423	0.1834	20.1%	***
Service exporter	0.2072	0.2483	28.2%	***
C. Average wages (log)				
Non-exporter	1.2964			
Goods exporter	1.5422	0.2458	27.9%	***
Service exporter	1.6227	0.3262	38.6%	***

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012. *** indicates statistical significance at the 1% level by t-test. Non-exporter is the firm without goods/service exports.

Table 7 Intra- and inter-firm exporters and firm characteristics

	(1) Intra-firm exporter	(2) Inter-firm exporter	(3) Diff. ((2) - (1))	(%)	
A. Firm size (log employees)					
Goods exporter	5.3654	5.4652	0.0998	10.5%	***
Service exporter	5.7592	5.9472	0.1880	20.7%	***
B. TFP					
Goods exporter	0.1319	0.1438	0.0119	1.2%	
Service exporter	0.1902	0.2239	0.0337	3.4%	***
C. Average wages (log)					
Goods exporter	1.4686	1.5531	0.0845	8.8%	***
Service exporter	1.5964	1.6470	0.0506	5.2%	***

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012. *** indicates statistical significance at the 1% level by t-test.

Table 8 Regression results for goods/service exports and productivity/wages

A. OLS	(1) TFP		(2) TFP		(3) TFP		(4) Wage		(5) Wage		(6) Wage	
Goods exporter	0.1413	***					0.1151	***				
	(0.0075)						(0.0044)					
Service exporter			0.1871	***					0.1743	***		
			(0.0114)						(0.0067)			
Pure goods exporter					0.1296	***					0.1025	***
					(0.0078)						(0.0046)	
Pure service exporter					0.1818	***					0.1580	***
					(0.0200)						(0.0118)	
Goods & service exporter					0.1932	***					0.1743	***
					(0.0126)						(0.0075)	

B. FE	(1) TFP		(2) TFP		(3) TFP		(4) Wage		(5) Wage		(6) Wage	
Goods exporter	0.0354	***					0.0243	***				
	(0.0079)						(0.0057)					
Service exporter			0.0421	***					0.0221	**		
			(0.0126)						(0.0093)			
Pure goods exporter					0.0327	***					0.0209	***
					(0.0078)						(0.0056)	
Pure service exporter					0.0208						0.0114	
					(0.0135)						(0.0093)	
Goods & service exporter					0.0521	***					0.0493	***
					(0.0120)						(0.0087)	

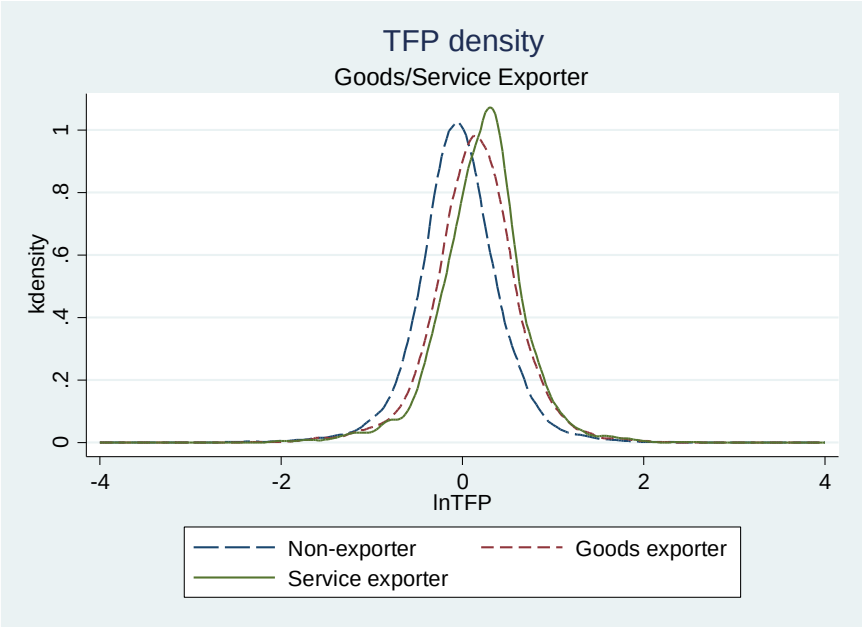
Note: Estimates from panel data for the years 2009 to 2012. The reference category is the non-exporting firms. Control variables are firm size (log employees) and year dummies. Three-digit industry dummies are included in the OLS estimations. The ratio of part time employees is also used to estimate wage level. Cluster-robust standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9 Regression results for intra- and inter-firm exporters

A. OLS	(1) TFP		(2) TFP		(3) TFP		(4) Wage		(5) Wage		(6) Wage	
Goods exporter	0.1350	***			0.1137	***	0.0900	***			0.0654	***
(Intra-firm)	(0.0151)				(0.0152)		(0.0092)				(0.0093)	
Goods exporter	0.1423	***			0.1225	***	0.1191	***			0.1004	***
(Inter-firm)	(0.0078)				(0.0079)		(0.0046)				(0.0046)	
Service exporter			0.1668	***	0.0739	***			0.1709	***	0.0960	***
(Intra-firms)			(0.0146)		(0.0143)				(0.0085)		(0.0084)	
Service exporter			0.2071	***	0.1280	***			0.1774	***	0.1106	***
(Inter-firm)			(0.0146)		(0.0142)				(0.0090)		(0.0087)	
B. FE	(1) TFP		(2) TFP		(3) TFP		(4) Wage		(5) Wage		(6) Wage	
Goods exporter	0.0385	***			0.0334	***	0.0230	***			0.0211	**
(Intra-firm)	(0.0120)				(0.0117)		(0.0087)				(0.0085)	
Goods exporter	0.0347	***			0.0324	***	0.0246	***			0.0229	***
(Inter-firm)	(0.0082)				(0.0080)		(0.0059)				(0.0057)	
Service exporter			0.0485	***	0.0199	*			0.0390	***	0.0346	***
(Intra-firms)			(0.0159)		(0.0110)				(0.0118)		(0.0079)	
Service exporter			0.0383	***	0.0199	*			0.0119		0.0107	
(Inter-firm)			(0.0139)		(0.0105)				(0.0102)		(0.0075)	

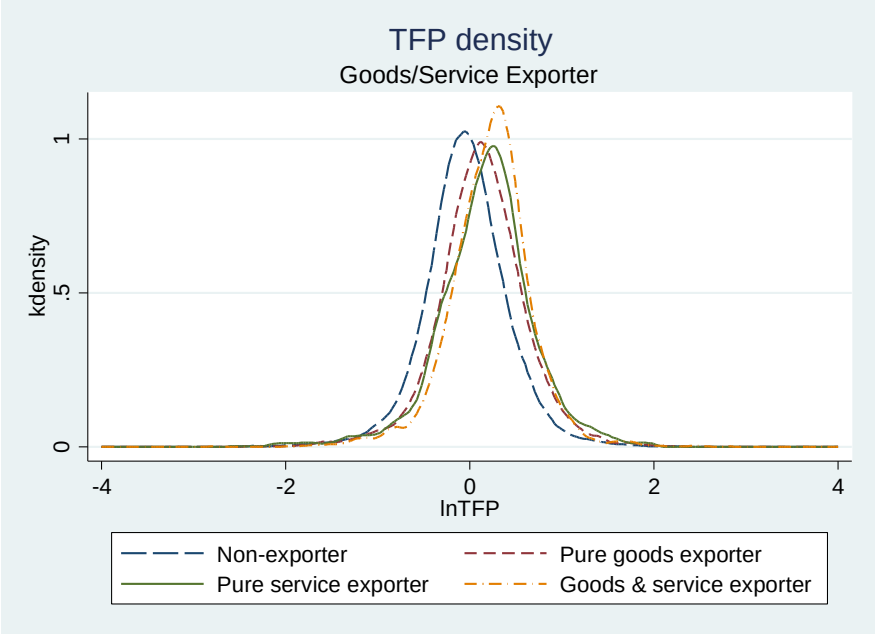
Note: Estimates from panel data for the years 2009 to 2012. The reference category is the non-exporting firms. Control variables are firm size (log employees) and year dummies. Three-digit industry dummies are included in the OLS estimations. The ratio of part-time employees is also used to estimate wage level. Cluster-robust standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Figure 1 Productivity distributions of non-exporters, goods exporters, and service exporters



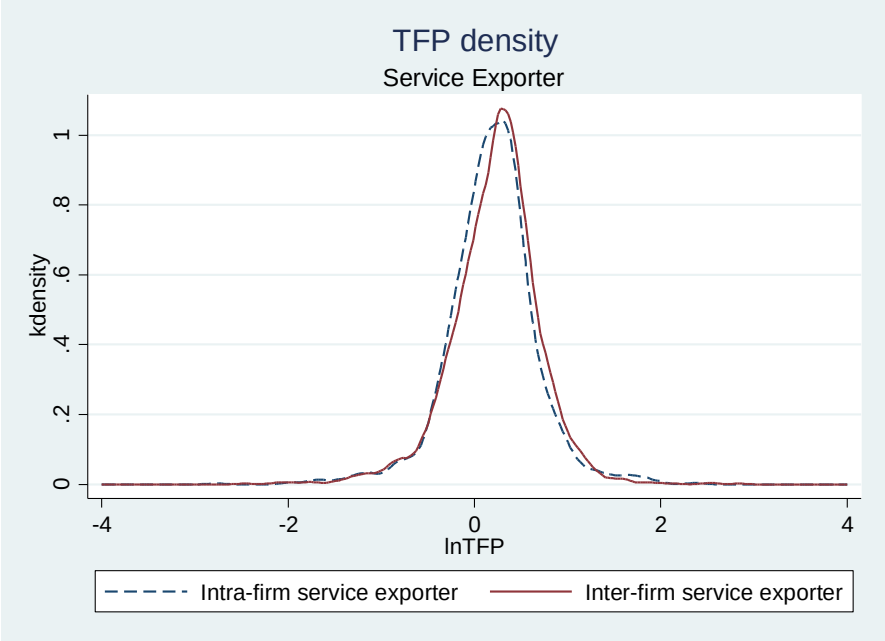
Note: Kernel densities calculated using the BSJBSA data for the fiscal years 2009 to 2012.

Figure 2 Productivity distributions of non-exporters, pure goods exporters, pure service exporters, and goods and services exporters



Note: Kernel densities calculated using the BSJBSA data for the fiscal years 2009 to 2012.

Figure 3 Productivity distributions of intra- and inter-firm service exporters



Note: Kernel densities calculated using the BSJBSA data for the fiscal years 2009 to 2012.

Appendix

Table A1 Composition of the Japanese service trade in 2013

	(1) Service exports			(2) Service imports		
	100 million yen	(%)		100 million yen	(%)	
Transport	38,605	26.8%		45,789	28.6%	
Sea transport	32,014		22.2%	33,362		20.8%
Air transport	6,584		4.6%	12,291		7.7%
Travel	14,767	10.2%		21,312	13.3%	
Other services	90,845	63.0%		92,931	58.1%	
Telecommunications	895		0.6%	1,325		0.8%
Construction	9,434		6.5%	7,326		4.6%
Insurance	172		0.1%	6,588		4.1%
Financial services	4,450		3.1%	3,525		2.2%
Information	1,752		1.2%	4,872		3.0%
Charges for the use of intellectual property	30,814		21.4%	17,392		10.9%
Other business services	40,660		28.2%	49,015		30.6%
Personal, cultural, and recreational services	154		0.1%	1,104		0.7%
Government services	2,517		1.7%	1,786		1.1%
Total service exports	144,218			160,031		

Note: The figures are calculated using the Balance of Payment statistics for the year 2013.

Table A2 The number of goods/service importers

	(1) Sample	(2) Non-importer		(3) Goods importer		(4) Service importer		(5) Pure service importer	
2009	29,096	22,325	76.7%	6,222	21.4%	1,441	5.0%	549	1.9%
2010	29,570	22,476	76.0%	6,492	22.0%	1,546	5.2%	602	2.0%
2011	30,647	23,287	76.0%	6,672	21.8%	1,685	5.5%	688	2.2%
2012	30,577	23,087	75.5%	6,804	22.3%	1,742	5.7%	686	2.2%
Total	119,890	91,175	76.0%	26,192	21.8%	6,414	5.3%	2,525	2.1%

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012. Pure service importer is the firm import service, but it does not import goods.

Table A3 Imports from affiliate and non-affiliate firms

	Number of the sample	(%)
Goods importer	26,192	21.8%
Intra-firm importer	3,951	3.3%
Inter-firm importer	22,241	18.6%
Service importer	6,414	5.3%
Intra-firm importer	1,689	1.4%
Inter-firm importer	4,725	3.9%
Total	119,890	

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012. Intra-firm importer is the firm importing only from the foreign affiliate firms. Inter-firm importer is the firm importing from non-affiliate firms.

Table A4 The value of goods/services imports (trillion yen, %)

	(1) Goods imports	(2) Inter-firm goods imports		(3) Service imports	(4) Inter-firm service imports	
2009	29.4	21.3	72.4%	0.9	0.5	56.6%
2010	35.6	25.5	71.6%	1.4	0.7	46.9%
2011	40.2	29.4	73.1%	1.4	0.5	36.8%
2012	43.2	30.4	70.4%	1.7	0.8	44.9%
Total	148.0	107.0	72.3%	5.4	2.5	45.3%

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012.

Table A5 The ratio of imports value to total sales

	(1) Goods imports (all firms)	(2) Goods importers only	(3) Service imports (all firms)	(4) Service importers only
2009	2.3%	10.9%	0.1%	2.3%
2010	2.4%	11.0%	0.1%	2.2%
2011	2.5%	11.6%	0.1%	2.3%
2012	2.6%	11.8%	0.2%	2.7%
Total	2.5%	11.3%	0.1%	2.4%

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012.

Table A6 The share of goods/service importers by industry

	(1) Goods importer	(2) Service importer	(3) Pure service importer	(4) Sample
Manufacturing	30.3%	6.0%	1.3%	52,755
Electricity & gas	7.5%	2.1%	0.7%	536
Wholesale	32.6%	4.8%	0.7%	23,018
Retail	9.3%	1.5%	0.4%	14,238
Information & communication	3.8%	12.7%	11.5%	9,776
Service	4.7%	3.8%	2.8%	16,494
Others	7.3%	2.4%	1.2%	3,073
Total	21.8%	5.3%	2.1%	119,890

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012. Pure service importer is the firm import service, it but does not import goods.

Table A7 Comparison of goods/service importers and non-importers

		Diff.	(%)	
A. Firm size (log employees)				
Non-importer	5.1795			
Goods importer	5.4069	0.2275	25.5%	***
Service importer	5.7089	0.5295	69.8%	***
B. TFP				
Non-importer	-0.0377			
Goods importer	0.1248	0.1624	17.6%	***
Service importer	0.2483	0.2860	33.1%	***
C. Average wages (log)				
Non-importer	1.3058			
Goods importer	1.5005	0.1946	21.5%	***
Service importer	1.6459	0.3401	40.5%	***

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012. *** indicates statistical significance at the 1% level by t-test. Non-importer is the firm without goods/service imports.

Table A8 Intra- and inter-firm importers and firm characteristics

	(1) Intra-firm importer	(2) Inter-firm importer	(3) Diff. ((2) - (1))	(%)	
A. Firm size (log employees)					
Goods importer	5.4766	5.3946	-0.0820	-7.9%	***
Service importer	5.5983	5.7485	0.1501	16.2%	***
B. TFP					
Goods importer	0.1327	0.1234	-0.0093	-0.9%	
Service importer	0.2966	0.2319	-0.0648	-6.3%	***
C. Average wages (log)					
Goods importer	1.5041	1.4998	-0.0044	-0.4%	
Service importer	1.6635	1.6396	-0.0239	-2.4%	**

Note: The figures are calculated using the BSJBSA data for the fiscal years 2009 to 2012. *** indicates statistical significance at the 1% level by t-test.

Table A9 Regression results on goods/service imports and productivity/wages

A. OLS	(1) TFP		(2) TFP		(3) TFP		(4) Wage		(5) Wage		(6) Wage	
Goods importer	0.1246	***					0.1002	***				
	(0.0071)						(0.0041)					
Service importer			0.2369	***					0.1823	***		
			(0.0122)						(0.0069)			
Pure goods importer					0.1025	***					0.0836	***
					(0.0072)						(0.0042)	
Pure service importer					0.1836	***					0.1437	***
					(0.0181)						(0.0109)	
Goods & service importer					0.2679	***					0.2004	***
					(0.0150)						(0.0080)	
B. FE	(1) TFP		(2) TFP		(3) TFP		(4) Wage		(5) Wage		(6) Wage	
Goods importer	0.0390	***					0.0184	***				
	(0.0072)						(0.0051)					
Service importer			0.0296	**					0.0164	*		
			(0.0125)						(0.0088)			
Pure goods importer					0.0357	***					0.0166	***
					(0.0071)						(0.0051)	
Pure service importer					0.0215						0.0077	
					(0.0132)						(0.0090)	
Goods & service importer					0.0508	***					0.0288	***
					(0.0119)						(0.0086)	

Note: Estimates from a panel data for the years 2009 to 2012. The reference category is the non-importing firms. Control variables are firm size (log employees) and year dummies. Three-digit industry dummies are included in the OLS estimations. The ratio of part-time employees is also used in estimating wage level. Cluster-robust standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A10 Regression results for intra- and inter-firm importers

A. OLS	(1) TFP		(2) TFP		(3) TFP		(4) Wage		(5) Wage		(6) Wage	
Goods importer	0.1142	***			0.0892	***	0.1040	***			0.0856	***
(Intra-firm)	(0.0141)				(0.0138)		(0.0088)				(0.0086)	
Goods importer	0.1264	***			0.1032	***	0.0995	***			0.0809	***
(Inter-firm)	(0.0074)				(0.0074)		(0.0042)				(0.0042)	
Service importer			0.2894	***	0.2223	***			0.1987	***	0.1406	***
(Intra-firm)			(0.0220)		(0.0215)				(0.0126)		(0.0122)	
Service importer			0.2188	***	0.1551	***			0.1763	***	0.1235	***
(Inter-firm)			(0.0135)		(0.0131)				(0.0076)		(0.0074)	
B. FE	(1) TFP		(2) TFP		(3) TFP		(4) Wage		(5) Wage		(6) Wage	
Goods importer	0.0389	***			0.0344	***	0.0129				0.0100	
(Intra-firm)	(0.0112)				(0.0110)		(0.0081)				(0.0080)	
Goods importer	0.0390	***			0.0353	***	0.0196	***			0.0185	***
(Inter-firm)	(0.0073)				(0.0072)		(0.0053)				(0.0052)	
Service importer			0.0246		0.0144				0.0227	*	0.0158	
(Intra-firm)			(0.0194)		(0.0146)				(0.0136)		(0.0101)	
Service importer			0.0310	**	0.0186	*			0.0145		0.0082	
(Inter-firm)			(0.0132)		(0.0096)				(0.0093)		(0.0067)	

Note: Estimates from panel data for the years 2009 to 2012. The reference category is non-importing firms. Control variables are firm size (log employees), year dummies, and three-digit industry dummies (OLS estimations). The ratio of part-time employees is used to estimate wage level. Cluster-robust standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.