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TOMIURA, Eiichi
RIETI

KUWAHATA, Hiroyuki
Nagasaki University



The Research Institute of Economy, Trade and Industry
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Productivity Premium of Firms Engaged in Offshoring and Service Trade with China: Evidence from a survey of Japanese firms^{*}

Eiichi Tomiura

Research Institute of Economy, Trade and Industry and Osuma Women's University
and

Hiroyuki Kuwahata
Nagasaki University

Abstract

Firms in advanced economies trade both goods and services across national borders. Offshoring is another important channel of modern globalization. However, these relatively invisible globalization modes are not well captured in official statistics. We also note that the globalization trend has recently been altered by the tensions originating with the rise of China. We conducted a unique survey of Japanese firms to collect information of these relatively new and invisible aspects of international economic relations with China. We combine our survey results with firm-level data derived from official statistics to explore the characteristics of firms that are active within these interactions with China. We find that firms that are involved in services trade with China or firms engaged in offshoring with China tend to be more productive than firms that are not engaged in these activities.

Keywords: Offshoring; Service trade; Productivity; China; Japanese firms; Firm-level data

JEL Classification: F14; L24; F23

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^{*} This study is conducted as a part of the Project “Empirical analysis of Japanese firms’ relationships with China and their responses to changing globalization” undertaken at the Research Institute of Economy, Trade and Industry (RIETI). This study utilizes the micro data of the questionnaire information of “the Basic Survey of Japanese Business Structure and Activities” conducted by the Ministry of Economy, Trade and Industry (METI), and the micro data of the results from “Survey of Overseas Business Activity related with China” conducted by RIETI. This study is also partly supported by KAKENHI (Grant-in-Aid for Scientific Research) 25K05061 of the Japan Society for the Promotion of Science. The draft of this paper was presented at the RIETI DP Seminar for the paper. I would like to thank those seminar participants, especially Kyoji Fukao and Yasuyuki Todo, for their helpful comments.

1. Introduction

The speed and the depth of globalization have been accelerated since the end of U.S.-Soviet Cold War and the China's joining WTO (World Trade Organization) at around the turn of the century. The globalization during this period was characterized not only by the rising volume of international trade in goods but also by expanding and emerging new aspects of cross-border activities, such as trade in services, offshore production made possible by foreign direct investment, offshoring of various tasks, and transfer of digital data. These new modes of globalization are often invisible, compared to trade in tangible goods recorded at custom gates, and thus not sufficiently tracked in official statistics. While globalization has had a drastic impact on our economies, we observe the turning point in global trade, i.e. the slowdown in global trade in goods in recent years after the Global Financial Crisis. The stagnation of world trade has been aggravated by the tension between U.S. and China. As a country geographically close to China, the involvement of Japanese firms in trade with China should be an important policy issue. We need to explore new measures to correctly capture the state of division of labor across countries in the current forms of globalization, especially focusing on the relationship with China.

To capture the rapidly increasing and deepening fragmentation of production processes, international trade studies have shifted research focuses to trade in intermediate inputs. TiVA (Trade in Value Added) database complied by OECD and WTO is a notable accomplishment along this line. Baldwin et al. (2023) find the “hidden exposure” of U.S. industries to Chinese suppliers by tracing input-output linkages not directly captured in conventional trade statistics.

However, the data of trade in goods based on custom clearance records linked with input-output tables do not suffice to characterize modern globalization modes, as custom clearance data do not squarely cover offshoring or trade in service. “Yesterday’s efforts to measure global value chains and fragmentation using trade in intermediate inputs simply do not capture today’s reality”, as Fort (2023, p.54) emphasizes in the U.S. case.¹

To fill the gap, we conducted a unique survey of firms in Japan to collect information on the involvement in offshoring and service trade with China. We cover virtually all mid- or large-

¹ Morikawa (2016) reports how factoryless goods producers differ from conventional manufacturing firms in the case of Japan based on the same firm-level dataset used in this paper.

sized firms, which are continuously traced in official statistics, in manufacturing, wholesale, retail, and major service industries.² Whether each firm is involved in offshoring or service trade with China is revealed in our survey. We then combine our survey results with firm-level data derived from official statistics to calculate basic firm attributes, such as firm size and productivity. Based on the linked data set, we estimate the productivity premium of firms engaged in offshoring or service trade with China. Our results show that firms offshoring manufacturing tasks or non-manufacturing tasks to China and firms exporting services to China or importing services from China tend to be significantly more productive than firms not active in any of these globalization activities. While the productivity premium of exporters of goods has firmly established as a stylized fact based on accumulated empirical studies since Bernard and Jensen (1995), our findings of premium associated with offshoring and trade in service are the first report in relation with China as far as we know and contribute to our understanding of intangible forms of globalization in our age. Our focus on China hopefully responds to our recent imminent concern in many countries amid the U.S.-China conflict.³

The rest of this paper is organized as follows. Section 2 describes our dataset. Our unique survey of Japanese firms is especially explained in detail, as it reveals whether each firm is active in offshoring to China or service trade with China. We also explain the official statistics, which we derive firm-level data and link with our survey results. Section 3 summarizes and discusses our main empirical findings. We report previously unnoticed numbers, such as the percentage of firms exporting service to China, and how high the productivity of firms involved in such cross-border transactions relative. The final section concludes with discussions of policy implications.

2. Description of data

2.1. Our survey of Japanese firms

This subsection describes our unique survey of Japanese firms. We explain the coverage of our survey and the questionnaires included in our survey. The basic statistics of our sample will be

² The exact coverage of industries will be explained in the next section.

³ On offshoring, Tomiura (2007) is an early report of the productivity premium of firms engaged in offshoring compared with exporters, FDI firms and domestic firms.

summarized.

We design our survey to cover all large- or mid-sized firms in manufacturing, wholesale, retail, or service industries in Japan. Our survey is supposed to cover all firms above the firm-size threshold, as the surveyed firms are the same as those in the government's official list for the official statistics, to which we link our survey results. The details of the official statistics will be explained in the next subsection. Among all the firms captured in the official statistics, we sent out the questionnaires to 20,000 firms. We select firms based on industries by omitting some of the service industries, which are unlikely to be deeply involved in offshore activities, such as hotels, restaurants, construction, broadcasting, road transport, and warehouses.⁴

We sent our questionnaires to the firms in September 2024 and accepted responses until November in the same year.⁵ As a result, we collected responses from 4,081 firms, more than one-fifth of firms to which we sent the questionnaires. As our survey focuses on offshoring and service trade with China, no question on basic firm attributes is included in our survey. The questions we included in our survey will be explained in Section 3 before reporting the findings. To examine the relationship with fundamental firm characteristics, such as productivity, we link our survey results with firm-level dataset derived from official statistics, which we describe in the next subsection.

Our survey asks each respondent firm whether the firm is involved in the following categories of cross-border transactions with China: offshoring manufacturing tasks, offshoring non-manufacturing tasks, exporting services, and importing services. These questions are intended to complement the existing database constructed from official statistics traditionally focusing on trade in goods.⁶ The official statistics, which we explain in the next subsection, have accumulated data on these categories of activities, though without disaggregation into destination/source countries. Our contribution is then to distinguish firms involved in these transactions with China versus those with other countries. To reduce non-response, we limit our

⁴ Our survey covers the following industries: manufacturing, wholesale, retail, information services, machine maintenance, professional services, advertising, and design.

⁵ We conducted our survey as a part of our research project at Research Institute of Economy, Trade, and Industry (RIETI). We outsourced the operation of the survey to Teikoku Databank, Ltd. (TDB) under the contract with RIETI.

⁶ Service trade statistics is far less complete or reliable compared to custom clearance-based data of trade in goods, as pointed out by Liberatore and Wettstein (2023) for example.

questions within categorical forms, namely yes or no on each category of transactions in the previous year. As a result, no quantitative information is available in our survey. Even within this data limitation, our survey can be a practical first step toward filling the gap between real-world global transactions and existing official statistics.

Table 1 reports the share of firms engaged in each cross-border invisible transactions with China. As expected from the established stylized facts in the international trade research, only limited fractions of firms are active in these cross-border activities. The share of firms offshoring manufacturing tasks to China is relatively high among the surveyed invisible types of transactions with China but remains only slightly less than a quarter.

Table 2 disaggregates the shares shown in Table 1 into each four-digit industry.⁷ Wide variations are observed across industries. For instance, more than thirty percent of the firm are offshoring manufacturing tasks to China in general machinery and electrical machinery industries, while the percentage is less than twenty in food products and iron/steel industries.

2.2. Firm-level data from official statistics

Firm-level dataset with which we link our survey results are drawn from official statistics, Basic Survey of Japanese Business Structure and Activities conducted by Ministry of Economy, Trade, and Industry (BSJBSA for short in what follows). All the firms above the given threshold (50 employees and capital of 30 million yen) in Japan in the industries specified below are basically covered. We also obtained permission from the government to have access to the list of firms for that official survey. This access to the list ensures that our unique survey covers all the firms above the threshold and can be regarded as representative for Japanese firms.

The official statistics BSJBSA contains a wide range of firm attributes, from which we draw the following variables for our analysis: *Sales*, *Labor*, *Capital*, *R&D*, *ICT expense*, and industries at the three-digit classification level. BSJBSA also has relatively detailed data related to cross-border transactions: exports of goods, imports of goods, exports of services, imports of

⁷ We include four-industry dummies on the right-hand side of our regressions for estimating the productivity premium. If an industry is composed of only one firm, we omit the industry from our analysis. Table 2 shows the statistics after excluding the three industries (agriculture, construction and electricity/gas supply).

services, offshoring of manufacturing tasks, offshoring of non-manufacturing tasks, as well as exports of goods to China, imports of goods from China⁸. China is the only country identified in BSJBSA as an export destination or import source in trade in goods, while the statistics reveals only the total value of service trade without separating any partner country. To fill the gap in exiting statistics, our survey asks each respondent firm whether the firm is active in offshoring or service trade with China.

We link our results from our survey conducted in 2024 with the firm-level dataset drawn from the official survey conducted in 2023, the most recent one at the time of this research, which contains corporate records for 2022. While we should be cautious in giving causal interpretations of our findings from our one-shot survey, we intend to frame our regressions to investigate the effects of firm characteristics observed in 2022 on the globalization choice in 2024. Table 3 displays the summary statistics of the variables used for our analysis. The firms captured in the official statistics but reporting zero employees are excluded.⁹ We note large variations across firms in our sample, as shown by the standard deviations.

3. Empirical findings

This section reports our main empirical findings from our unique survey results linked with firm-level data drawn from official statistics, mainly the productivity premium. We also examine the gap between firms active in offshoring and service trade and domestic firms in other firm attributes, such as R&D intensity, and discuss their implications.

3.1. Productivity premium of firms trading with China

Table 4 reports the estimated productivity premium. We always include firm size (in terms of employment) and industries (at the three-digit level) on the right-hand size of regressions. In all cases in the table, the productivity premium is significantly positive, indicating that firms involved in any of the globalization modes in our survey are significantly more productive than

⁸ In BSJBSA, “offshoring” is defined as contracting-out of tasks to other firms (including own subsidiaries if they are independent legal entities) located in foreign countries.

⁹ In the latter part of Table 3, (B), the firms are omitted from the table if the response of a firm to our survey contradicts with the firm’s record in official statistics.

firms not active in that globalization mode. We also note that the productivity premium of firms trading with China is estimated to be not drastically different from that of firms engaged in the same category of cross-border activities with any other countries combined, as shown by the contrast between odd-numbered and even-numbered rows in this table.

3.2. Robustness checks

To check whether our finding of productivity premium is robust, we conduct several checks. First, we check the consistency between our survey and official statistics. Second, we check whether the productivity premium is due to the trade itself (with any country) or to the trade particularly with China. Third, we estimate the main regressions with additional or alternative control variables. Finally, we consider the firms' involvement in multiple modes of global transactions.

First, we have checked the consistency between the response to our survey and that to the official statistics. For example, some firms recorded no service exports to any country in official statistics but reported the involvement in service exports to China in our survey. Even after excluding these firms with contradictory responses, our principal finding of significantly positive productivity premium remains robust (Table 5).

Second, except for the case of exporting goods, we have confirmed no substantial differences between China and other countries: i.e. the productivity premium of firms active in one of the global transactions and that of firms actively involved in that category of transactions with China (Table 6). We find that firms exporting goods to China tend to be more productive than goods exporters in general, i.e. firms exporting goods to any foreign countries, possibly reflecting China's comparative advantage in manufacturing.

Third, as we measure the firm's productivity in terms of labor productivity, we have replaced firm size with capital-labor ratio as a control variable on the right-hand side of our regressions. We have also checked our results by estimating the same regressions without firm-size controls. The results from these checks show that our main results are basically intact with the alternative control or without control, as displayed in Appendix Tables A1 and A2.

Fourth, we consider the impact of firms' involvement in more than one modes of cross-border transactions. In Table 4, the productivity premium is estimated based on the comparison of

firms involved in one of the globalization modes with all other firms combined. However, some firms are active in more than one globalization modes. For instance, a firm may export services to China but the same firm may be involved in offshoring non-manufacturing tasks to China. To consider such multiple involvements, we estimate the regressions with dummies for the involvement in multiple modes but we observe limited variations across various patterns of multiple engagements. See Appendix Table A3 for the regression with all possible combinations of trading patterns in our survey.

3.3. Other comparative attributes of firms trading with China

While we have focused on the productivity premium, the firms engaged in offshoring or service trade with China are likely to differ in other dimensions. This subsection compares firms in the following three major ratios often used in standard economic analyses: the R&D intensity, the ICT intensity (expenditure on ICT relative to sales), and capital-labor ratio. We limit our analysis to the limited sample of firms: i.e. excluding firms with inconsistent responses.

We present the estimated premium on these three ratios in Tables 7, 8, and 9. The size, sign, and its statistical significance vary across them. First, as shown in Table 7, R&D intensity is significantly positive in all cases in the table, showing that R&D-intensive firms are active in these cross-border transactions with China. Although we cannot pin down the direction of causality based solely on our one-shot survey, sufficiently R&D intensive firms find cross-border activities to be profitable or firms involved in these cross-border activities tend to be active in R&D. Relatively high R&D intensity has often been observed in globalized firms based on data of trade in goods.

As displayed in Table 8, firms offshoring non-manufacturing tasks tend to be more ICT intensive, but such clear gap is not found in any other cases in the table. To offshore non-manufacturing tasks often requires heavy investment in ICT, but our findings imply that such ICT requirement may not be serious if firms engage in offshoring manufacturing tasks or service trade.

However, the capital intensity turns out to be insignificantly different between firms active in these globalization modes and those inactive in Table 9, except for firms exporting services. The relationship with physical capital appears to be not strong or stable in characterizing firms involved in offshoring of non-manufacturing tasks or service trade.

4. Concluding remarks

Many firms around the globe are active in cross-border activities, not limited to conventional trade in goods. Offshoring and service trade are among the rapidly growing parts of global corporate activities but have not been sufficiently traced in official statistics. On the other hand, the world economy faces a serious tension, at least partly triggered by the rise of China as a major trading partner. To fill the gap in conventional statistics and to respond to the needs in policy circles, we conducted a unique survey of Japanese firms focusing on offshoring and service trade with China. Our empirical findings show that only limited shares of firms are involved in these cross-border transactions and tend to be more productive than domestic firms. Our finding of productivity premium of firms engaged in offshoring or service trade with China is a first report to the best of our knowledge.

While our survey can be regarded as a first step toward gathering information on invisible trade, there remain several noticeable limitations in our dataset and are left for future studies. Among them, quantitative information is vital to evaluate the magnitude of these transactions. Another useful extension will be the construction of panel datasets, by tracking the activities of firms over time.

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Table 1 Percentages of firms trading with China

Types of trade with China	Percentages
Exporting services to China	11.65
Importing services from China	9.53
Offshoring manufacturing tasks to China	24.06
Offshoring non-manufacturing tasks to China	10.44
Exporting services to China and importing services from China	6.32
Offshoring manufacturing tasks to China and non-manufacturing tasks to China	7.26
Exporting services to China and offshoring manufacturing tasks to China	5.90
Importing services from China and offshoring manufacturing tasks to China	6.09
Exporting services to China and offshoring non-manufacturing tasks to China	4.99
Importing services from China and offshoring non-manufacturing tasks to China	4.52
Exporting services to China, importing services from China and offshoring manufacturing tasks to China	4.26
Exporting services to China, importing services from China and offshoring non-manufacturing tasks to China	3.45
Exporting services to China, and offshoring manufacturing tasks to China and non-manufacturing tasks to China	3.55
Importing services from China, and offshoring manufacturing tasks to China and non-manufacturing tasks to China	3.50
Exporting services to China, importing services from China, and offshoring manufacturing tasks to China and non-manufacturing tasks to China	2.74

Table 2 Industrial disaggregation

Industry	Offshoring manufacturing tasks to China	Offshoring non-manufacturing tasks to China	Exporting services to China	Importing services from China	N of firms
Food products	13.1	5.2	10.7	5.5	385
Textiles	30.0	8.6	5.7	5.7	70
Wood products	9.1	0.0	4.5	4.5	22
Pulp & Paper	14.3	4.5	7.1	3.9	154
Chemicals	27.3	10.0	16.2	11.5	272
Petroleum and Coal Products	0.0	0.0	12.5	0.0	8
Rubber products	47.4	18.9	32.4	27.0	38
Glass & Ceramics	13.4	4.9	7.3	9.8	82
Iron & Steel	15.6	5.3	5.3	1.3	77
Nonferrous metals	25.5	7.8	7.8	7.8	51
Metal Products	25.0	5.9	11.0	7.6	236
General Machinery	37.2	18.5	18.5	11.6	381
Electrical machinery	32.8	14.8	15.2	12.3	271
Transportation equipment	24.5	10.6	9.8	9.4	246
Other manufacturing	34.7	10.4	11.8	11.8	144
Information and Communications	5.1	7.7	7.7	7.7	39
Warehousing & Transportation	16.7	8.3	16.7	16.7	12
Wholesale	24.6	12.0	11.0	11.7	1,108
Retail	9.2	4.6	2.6	2.6	196
Service	13.5	19.2	17.3	9.6	52

Notes: Shown are the percentages of firms engaged in each cross-border activity. Industries are disaggregated at the three-digit level.

Table 3 Summary statistics

(A) All firms

Variables	Average	St. Dev	Max	Min	N
<i>Sales</i>	13,592.760	60,679.770	1,785,063	220	3,844
<i>L</i>	207.573	660.585	22,381	5	3,843
<i>K/L</i>	11.724	14.764	402.682	0	3,839
<i>R&D/Sales</i>	0.010	0.036	0.930	0	3,844
<i>ICT/Sales</i>	0.003	0.030	1.806	0	3,844

(B) Firms with consistent responses

Variables	Average	St. Dev	Max	Min	
<i>Sales</i>	13,635.530	61,482.390	1,785,063	220	3,725
<i>L</i>	207.274	669.034	22,381	5	3,724
<i>K/L</i>	11.760	14.906	402.682	0	3,720
<i>R&D/Sales</i>	0.010	0.037	0.930	0	3,725
<i>ICT/Sales</i>	0.003	0.008	0.411	0	3,725

Notes: *Sales* are in million yen. *L* counts the number of regular employees. *K* measures the yen value of tangible fixed assets. *R&D* and *ICT* denote the expenditures on R&D and ICT (information and communication technology), respectively. We omit firms from the part (B) when their responses to our survey are inconsistent with those to official statistics.

Table 4 Productivity premium of firms trading with China

	Premium in labor productivity	Adj.R ²	N
(1) Offshoring manufacturing tasks	0.0639 (0.0388)*	0.3578	3,843
(2) Offshoring manufacturing tasks to China	0.0933 (0.0251)***	0.3596	3,836
(3) Offshoring non-manufacturing tasks	0.2126 (0.0684)***	0.3593	3,843
(4) Offshoring non-manufacturing tasks to China	0.2099 (0.0354)***	0.3630	3,830
(5) Exporting services	0.1893 (0.0378)***	0.3609	3,843
(6) Exporting services to China	0.1390 (0.0345)***	0.3603	3,828
(7) Importing services	0.1228 (0.0432)***	0.3585	3,843
(8) Importing services from China	0.1809 (0.0371)***	0.3614	3,828
(9) Exporting goods	0.1922 (0.0247)***	0.3674	3,843
(10) Exporting goods to China	0.1933 (0.0269)***	0.3653	3,843
(11) Importing goods	0.1886 (0.0241)***	0.3677	3,843
(12) Importing goods from China	0.1587 (0.0265)***	0.3631	3,843

Notes: Shown premium is estimated as the coefficient on the globalization mode dummy. Included also on the right-hand side of the regression for estimating the premium are 3-digit industry dummies and firm size. Labor productivity is sales divided by the number of regular employees. Firm size is measured in sales. Both are in logarithms. Statistical significance is denoted by asterisks: 1% by ***, 5% by **, and 10% by *.

Table 5 Productivity premium estimated after omitting firms with inconsistent responses

	Premium in labor productivity	Adj.R ²	N
(1) Offshoring manufacturing tasks	0.0639 (0.0388)*	0.3578	3,843
(2) Offshoring manufacturing tasks to China	0.1462 (0.0488)***	0.3657	3,107
(3) Offshoring non-manufacturing tasks	0.2126 (0.0684)***	0.3593	3,843
(4) Offshoring non-manufacturing tasks to China	0.1757 (0.0948)*	0.3452	3,479
(5) Exporting services	0.1893 (0.0378)***	0.3609	3,843
(6) Exporting services to China	0.1691 (0.0577)***	0.3508	3,482
(7) Importing services	0.1228 (0.0432)***	0.3585	3,843
(8) Importing services from China	0.1762 (0.0769)**	0.3500	3,514
(9) Exporting goods	0.1922 (0.0247)***	0.3674	3,843
(10) Exporting goods to China	0.1933 (0.0269)***	0.3653	3,843
(11) Importing goods	0.1886 (0.0241)***	0.3677	3,843
(12) Importing goods from China	0.1587 (0.0265)***	0.3632	3,843

Notes: We omit the firms, of which the responses to our survey and those to official statistics are inconsistent, from the samples for this table. See notes to Table 4.

Table 6 Productivity premium due to trading with China

	Premium in labor productivity	Adj.R ²	N
(1) Offshoring manufacturing tasks	0.0484 (0.0640) 0.1012 (0.0760)	0.3656	3,107
Offshoring manufacturing tasks to China			
(2) Offshoring non-manufacturing tasks	0.3122 (0.0938)*** -0.1234 (0.1306)	0.3477	3,479
Offshoring non-manufacturing tasks to China			
(3) Exporting services	0.2380 (0.0465)*** -0.033 (0.0690)	0.3549	3,482
Exporting services to China			
(4) Importing services	0.1392 (0.0502)*** 0.0513 (0.0887)	0.3511	3,514
Importing services from China			
(5) Exporting goods	0.1260 (0.0372)*** 0.0860 (0.0409)**	0.3582	3,514
Exporting goods to China			
(6) Importing goods	0.1542 (0.0364)*** 0.0470 (0.0411)	0.3586	3,514
Importing goods from China			

Notes: Two dummies for cross-border transactions are included on the right-hand side of each regression: one for the involvement in respective transaction with any foreign country and the other for trading with China. We use the samples after omitting inconsistent responses as used for Table 5. See also notes to Table 4.

Table 7 Premium in R&D intensity

	<i>R&D/Sales</i>	Adj.R2	N
(1) Offshoring manufacturing tasks	0.0070 (0.0030)**	0.1077	3,843
(2) Offshoring manufacturing tasks to China	0.0055 (0.0019)***	0.1084	3,836
(3) Offshoring non-manufacturing tasks	0.0182 (0.0047)***	0.1123	3,843
(4) Offshoring non-manufacturing tasks to China	0.0124 (0.0033)***	0.1145	3,830
(5) Exporting services	0.0153 (0.0040)***	0.117	3,843
(6) Exporting services to China	0.0136 (0.0031)***	0.1174	3,828
(7) Importing services	0.0189 (0.0051)***	0.1193	3,843
(8) Importing services from China	0.0034 (0.0018)*	0.1053	3,828
(9) Exporting goods	0.0123 (0.0016)***	0.1267	3,843
(10) Exporting goods to China	0.0137 (0.0022)***	0.1262	3,843
(11) Importing goods	0.0094 (0.0015)***	0.1186	3,843
(12) Importing goods from China	0.0068 (0.0015)***	0.1107	3,843

Notes: See also notes to Table 4.

Table 8 Premium in ICT intensity

	<i>ICT/Sales</i>	Adj.R2	N
(1) Offshoring manufacturing tasks	0.00002 (0.0003)	-0.0039	3,843
(2) Offshoring manufacturing tasks to China	0.003 (0.0025)	-0.0022	3,836
(3) Offshoring non-manufacturing tasks	0.0013 (0.0004)***	-0.0039	3,843
(4) Offshoring non-manufacturing tasks to China	-0.0001 (0.0003)	-0.0040	3,830
(5) Exporting services	0.0001 (0.0003)	-0.0039	3,843
(6) Exporting services to China	-0.0003 (0.0002)	-0.0040	3,828
(7) Importing services	0.0006 (0.0003)*	-0.0039	3,843
(8) Importing services from China	-0.0002 (0.0005)	-0.004	3,828
(9) Exporting goods	0.0001 (0.0006)	-0.0039	3,843
(10) Exporting goods to China	0.0004 (0.0007)	-0.0039	3,843
(11) Importing goods	-0.0001 (0.0007)	-0.0039	3,843
(12) Importing goods from China	0.0003 (0.0007)	-0.0039	3,843

Notes: ICT is measured by the expenses of information and communication equipment. See also notes to Table 4.

Table 9 Premium in capital intensity

	K/L	Adj.R2	N
(1) Offshoring manufacturing tasks	-0.6402 (0.6386)	0.0296	3,839
(2) Offshoring manufacturing tasks to China	-0.4309 (0.4184)	0.0299	3,832
(3) Offshoring non-manufacturing tasks	1.3239 (1.6151)	0.0297	3,839
(4) Offshoring non-manufacturing tasks to China	0.653 (0.6955)	0.0299	3,826
(5) Exporting services	3.0736 (0.9179)***	0.0323	3,839
(6) Exporting services to China	0.5576 (0.6093)	0.0298	3,824
(7) Importing services	1.268 (1.0277)	0.0298	3,839
(8) Importing services from China	0.9403 (0.7107)	0.0300	3,824
(9) Exporting goods	0.5126 (0.4337)	0.0297	3,839
(10) Exporting goods to China	0.7603 (0.4859)	0.0298	3,839
(11) Importing goods	-0.0544 (0.4158)	0.0294	3,839
(12) Importing goods from China	-0.1646 (0.4279)	0.0295	3,839

Notes: K/L is the yen value of tangible fixed assets divided by the number of regular employees. See also notes to Table 4.

Appendix Tables

Table A1 Labor productivity premium estimated with controlling for capital intensity

	Premium in labor productivity	Adj.R2	N
(1) Offshoring manufacturing tasks	0.1112 (0.0378)***	0.3963	3,839
(2) Offshoring manufacturing tasks to China	0.1422 (0.0237)***	0.4006	3,832
(3) Offshoring non-manufacturing tasks	0.2651 (0.0663)***	0.398	3,839
(4) Offshoring non-manufacturing tasks to China	0.2693 (0.0333)***	0.4052	3,826
(5) Exporting services	0.2243 (0.0352)***	0.4002	3,839
(6) Exporting services to China	0.1923 (0.0322)***	0.4011	3,824
(7) Importing services	0.1700 (0.0400)***	0.3973	3,839
(8) Importing services from China	0.2273 (0.0351)***	0.402	3,824
(9) Exporting goods	0.2228 (0.0228)***	0.4096	3,839
(10) Exporting goods to China	0.2333 (0.0245)***	0.4077	3,839
(11) Importing goods	0.2207 (0.0226)***	0.4100	3,839
(12) Importing goods from China	0.1964 (0.0249)***	0.4042	3,839

Notes: Firm size included on the right-hand side of in the baseline regressions is replaced by capital-labor ratio in the regressions for this table. See also notes to Table 4.

Table A2 Estimations of premium without firm-size controls

	Premium in labor productivity	Adj.R2	N
(1) Offshoring manufacturing tasks	0.1045 (0.0393)***	0.3462	3,843
(2) Offshoring manufacturing tasks to China	0.1383 (0.0247)***	0.3501	3,836
(3) Offshoring non-manufacturing tasks	0.2846 (0.0686)***	0.3485	3,843
(4) Offshoring non-manufacturing tasks to China	0.2803 (0.0348)***	0.3558	3,830
(5) Exporting services	0.2640 (0.0369)***	0.3522	3,843
(6) Exporting services to China	0.2018 (0.0340)***	0.3514	3,828
(7) Importing services	0.1884 (0.0431)***	0.3478	3,843
(8) Importing services from China	0.2410 (0.0367)***	0.3526	3,828
(9) Exporting goods	0.2348 (0.0237)***	0.3611	3,843
(10) Exporting goods to China	0.2443 (0.0253)***	0.3589	3,843
(11) Importing goods	0.2252 (0.0235)***	0.3605	3,843
(12) Importing goods from China	0.2012 (0.0259)***	0.3546	3,843

Notes: See notes to Table 4.

Table A3 Productivity premium of firms engaged in multiple globalization modes

Patterns of involvement	Productivity premium
Exporting goods to China	0.1352 (0.0473)***
Importing goods from China	0.3775 (0.0961)***
Exporting services to China	-0.0545 (0.0841)
Importing services from China	0.3445 (0.1119)***
Offshoring manufacturing tasks to China	0.0351 (0.0536)
Offshoring non-manufacturing tasks to China	0.1156 (0.1251)
Exporting goods to China and importing goods from China	-0.1780 (0.1235)
Exporting goods and services to China	-0.1476 (0.1203)
Exporting goods to China and importing services from China	-0.2177 (0.2643)
Exporting services to China and importing goods from China	-0.4396 (0.6500)
Exporting services to China and importing services from China	-0.1228 (0.2254)
Importing goods and services from China	-1.0934 (0.2884)***
Offshoring manufacturing and non-manufacturing tasks to China	-0.1942 (0.1991)
Exporting goods to China and offshoring manufacturing tasks to China	0.0596 (0.3778)
Importing goods from China and offshoring manufacturing tasks to China	-0.1780 (0.1235)

Exporting services to China and offshoring manufacturing tasks to China	0.0596 (0.3778)
Importing services from China and offshoring manufacturing tasks to China	-0.2022 (0.2068)
Exporting goods to China and offshoring non-manufacturing tasks to China	0.0876 (0.2159)
Importing goods from China and offshoring non-manufacturing tasks to China	-0.0831 (0.3529)
Exporting services to China and offshoring non-manufacturing tasks to China	0.3046 (0.3109)
Importing services from China and offshoring non-manufacturing tasks to China	-1.0972 (0.3390)***
Exporting goods to China, importing goods from China and offshoring manufacturing tasks to China	0.1314 (0.1859)
Exporting goods to China, importing goods from China and offshoring non-manufacturing tasks to China	-0.0451 (0.4332)
Exporting services to China, importing services from China and offshoring manufacturing tasks to China	0.1953 (0.4908)
Exporting services to China, importing services from China and offshoring non-manufacturing tasks to China	0.7198 (0.5016)
Exporting goods to China, importing services from China and offshoring manufacturing tasks to China	0.0422 (0.3431)
Exporting goods to China, importing services from China and offshoring non-manufacturing tasks to China	0.3897 (0.6736)
Exporting services to China, importing goods from China and offshoring manufacturing tasks to China	0.1176 (0.7625)
Exporting services to China, importing goods from China and offshoring non-manufacturing tasks to China	-0.2805 (0.7851)
Exporting goods to China, and offshoring manufacturing and non-manufacturing tasks to China	0.1610 (0.3169)
Importing goods from China, and offshoring manufacturing and non-manufacturing tasks to China	0.3246 (0.4042)
Exporting services to China, and offshoring manufacturing and non-manufacturing tasks to China	0.1756 (0.5289)

Importing services from China, and offshoring manufacturing and non-manufacturing tasks to China	1.1895 (0.4378)***
Exporting goods and services to China, and importing services from China	0.3290 (0.4105)
Exporting goods and services to China, and importing goods from China	0.5548 (0.6733)
Importing goods and services from China, and exporting goods to China	0.3567 (0.4332)
Exporting goods and services to China and offshoring manufacturing tasks to China	0.2721 (0.4404)
Importing goods and services from China and offshoring manufacturing tasks to China	0.9731 (0.3613)***
Exporting goods and services to China and offshoring non-manufacturing tasks to China	-0.1265 (0.4213)
Importing goods and services from China and offshoring non-manufacturing tasks to China	0.8693 (0.7074)
Importing goods and services from China, and exporting services to China	1.4600 (0.9345)
Exporting goods to China, importing goods from China, and offshoring manufacturing and non-manufacturing tasks to China	-0.1985 (0.5133)
Exporting services to China, importing services from China, and offshoring manufacturing and non-manufacturing tasks to China	-0.9833 (0.7482)
Exporting goods to China, importing services from China, and offshoring manufacturing and non-manufacturing tasks to China	-0.5531 (0.7535)
Exporting services to China, importing goods from China, and offshoring manufacturing and non-manufacturing tasks to China	0.3967 (1.0327)
Exporting goods and services to China, importing goods from China, and offshoring manufacturing tasks to China	-0.4958 (0.8219)
Exporting goods and services to China, importing services from China and offshoring manufacturing tasks to China	-0.1556 (0.7213)
Exporting goods to China, importing goods and services from China, and offshoring manufacturing tasks to China	-0.1638 (0.5328)
Exporting goods and services to China, importing services from China and offshoring non-manufacturing tasks to China	-0.7284 (0.8814)

Exporting goods and services to China, importing goods from China, and offshoring non-manufacturing tasks to China	-0.0524 (0.9110)
Exporting goods to China, importing goods and services from China, and offshoring manufacturing tasks to China	0.7605 (0.9572)
Exporting goods and services to China, importing goods from China, and importing services from China,	-0.8645 (1.0391)
Exporting goods and services to China, offshoring manufacturing and non-manufacturing tasks to China,	-0.6732 (0.6735)
Importing goods and services from China, offshoring manufacturing and non-manufacturing tasks to China	-0.8136 (0.8702)
Importing goods and services from China, exporting services to China, and offshoring manufacturing tasks to China	-0.9591 (1.0932)
Importing goods and services from China, exporting services to China, and offshoring non-manufacturing tasks to China	-1.2411 (1.1836)
Importing goods and services from China, exporting services to China, and offshoring manufacturing and non-manufacturing tasks to China	0.5472 (1.5071)
Exporting goods and services to China, importing services from China, and offshoring manufacturing and non-manufacturing tasks to China	1.1429 (1.1499)
Exporting goods to China, importing goods and services from China, and offshoring manufacturing and non-manufacturing tasks to China	-0.6823 (1.1274)
Exporting goods and services to China, importing goods from China, and offshoring manufacturing and non-manufacturing tasks to China	0.2931 (1.1885)
Exporting goods and services to China, importing goods and services from China, and offshoring manufacturing tasks to China	0.2643 (1.2737)
Exporting goods and services to China, importing goods and services from China, and offshoring non-manufacturing tasks to China	0.8369 (1.4852)
Exporting goods and services to China, importing goods and services from China, and offshoring manufacturing and non-manufacturing tasks to China	-0.4704 (1.8507)
Adj.R ² = 0.3729, N = 3827	

Notes: See notes to Table 4.