Preliminary

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Premia of Offshoring:
Evidence from Japanese Manufacturing Firms

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Abstract

In the recent 10-years, offshore sourcing of Japanese firms to East Asian countries has rapidly increased. Our survey on Japanese offshoring presents that 20 percent of Japanese companies in total are performing offshore sourcing and more than 50 percent of companies with 300 or more employees are conducting offshore sourcing in China and other East Asian countries mainly for the tasks of their manufacturing parts and intermediate goods or assembling final goods. It is predictable that such an increase of offshoring causes the impact on productivity through stimulating the exit of firms with low efficiency from the market and changing resource allocation within or between firms. Our empirical estimation using Japanese firm-level data presents clear evidences that the level of labor productivity differs by 3 percent between offshoring and non-offshoring firms, and that offshoring raises the labor productivity by 5 percent *ceteris paribus*.

JEL Classification: F10, F14, F20

Keywords: offshore sourcing, arm's-length, in-sourcing, coordination cost, productivity

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1. Introduction

The statistics of international trade show that the trade expansion of parts and intermediate goods has caused the dramatic increase of trade in the world after 1990. Looking at the recent increase of trade in East Asia, we find that offshoring of Japanese firms to China and other East Asian countries is resulting in a dramatic change of corporate activities as well as the trade structure in Japan. The production process of goods and services is comprised of a bundle of tasks. When the production process is fragmented and the task in each production process is carried out across different geographical locations, coordinating the tasks entails additional costs. The coordination cost is low when each task is integrated or carried out within a country, whereas it is high when the unbundled tasks are conducted in different countries. However, we find that recent improvement in ICT and development in air shipping are reducing the coordination cost significantly. Consequently, unbundling of tasks and their global offshoring are on a steep increase. Recent progress in division of tasks has promoted repeated transactions of parts, intermediate products, and services across national borders and helped register an explosive increase in the volume of international trade after the 1990s. It is notable that the global offshoring of tasks is revolutionizing the paradigm of international trade[1].

As international division of tasks through offshoring causes the reallocation of resources from a task of low productivity to one of higher productivity within or between firms, it is predictable that offshoring raises the productivity. It will raise national income if the resources in low productivity sector are smoothly displaced to high productivity sector. We find some previous studies on the effect of offshoring on productivity. Egger and Egger (2001) studied the impact of offshore sourcing on the productivity of low-skilled workers using data of manufacturing industries in EU countries and found in the short run, one percent increase of

[1] See Grossman and Rossi-Hansberg (2006) and Baldwin and Nicoud (2007) for theoretical discussion on this issue.

offshore sourcing leads to 0.18 percent decrease in labor productivity, but in long run 0.53 percent increase. Amiti and Wei (2004), using US manufacturing industry data between 1992 and 2000, find that service offshoring has a significant positive effect on productivity in the US, accounting for around 11 percent of productivity growth during this period. They also find that offshoring material inputs has a positive effect on productivity, but the magnitude is smaller accounting for approximately 5 percent of productivity growth. Görg and Hanley (2003, 2005), using the data of electronics firms in Ireland between 1990 and 1995, estimate the effect of outsourcing on labor productivity and TFP. They find no clear impact of offshoring on labor productivity, but a positive and significant effect on TFP. They also find a positive and significant productivity impact on materials production, but an insignificant impact on services. With regard to Japanese firms, Head and Ries (2002) investigate the influence of offshore production by Japanese multinationals on domestic skill intensity and find a positive effect of FDI on domestic skill intensity and a positive effect of increasing overseas employment on domestic skill intensity. Hijzen, Inui and Todo (2006) estimate the impact of offshoring on TFP, using Japanese firm-level data for the period 1994–2000, and find a positive effect of offshoring intensity on growth of TFP. Tomiura (2007) is the first analysis of the impact of Japanese offshoring on productivity, using detailed firm-level data. It examines the productivity ordering among firms operate domestic, outsource, export, and invest abroad, and finds that foreign outsourcers are less productive than the firms active in FDI, but more productive than domestic firms. However, the definition of offshoring in these studies is commonly limited to the transaction between Japanese firms and their overseas affiliates, or otherwise includes the imports of parts and materials through arm's length transaction, and does not exactly match with the foreign outsourcing.

In spite of recent increase of offshoring of Japanese firms, we find few studies on the

precise impact of their offshoring on productivity. This is due to the limitation of availability in firm-level data of offshoring of Japanese firms. In order to supplement the insufficiency of firm-level data of Japanese offshoring, Ito, Tomiura and Wakasugi (2007) conducted the first survey on Japanese firm's offshore sourcing, in collaboration with the Research Institute of Economy, Trade and Industry (RIETI). The firm-level data based on our investigation are useful for examining the features of Japanese offshoring and its impact on productivity. The purpose of this paper is to introduce the features of offshoring of Japanese firms in material production and analyze the effects of offshore sourcing of Japanese firms on the level and growth of productivity, by linking the survey data of offshore sourcing with the firm-level data of business activities.

This paper consists of four sections. The next section, based on our original survey, introduces the feature of offshoring of Japanese firms by task between 2001 and 2006. It includes the ratio of offshoring firms, the destination of offshored tasks, industry characteristics, the effect of firm size, the type of tasks by transactions. We find that almost 20% of Japanese manufacturing firms employing more than 50 have offshore outsourced the production stage of intermediate products or the assembly stage of final goods. The third section empirically describes the premia of offshore sourcing. The fourth section examines the impact of offshoring on level and growth of productivity, by using Japanese firm-level data. The last section discusses the policy issues related to offshoring.

2. Offshoring of Japanese firms: An overview

2.1 Type of outsourcing

Ito, Tomiura and Wakasugi (2007), in collaboration with RIETI, surveyed the offshore sourcing of Japanese manufacturing firms. Hereafter, we simply refer this survey to "Survey." It covers

approximately 5,000 Japanese manufacturing firms with 50 or more employees. In the Survey, "offshoring of tasks" is defined by offshore sourcing wherein a contract outlines the specifications of tasks, through (i) intra-firm transactions with the firm's own subsidiaries, (ii) arm's-length transactions with other Japanese subsidiaries, or (iii) arm's-length transactions with foreign firms. In other words, this Survey posits that offshoring includes not only the outsourcing between firms in a market but also the division of tasks with the subsidiaries of multinational firms if the tasks are commissioned under the specific contract. Thus, offshoring of tasks includes the international division of tasks between firms as well as within a firm. However, offshore outsourcing is different from offshore purchasing wherein no contract to specify the tasks in advance is concluded.

The division of tasks of Japanese firms in general is progressing in the domestic and overseas markets. The number of firms practicing division of tasks in the domestic market comprises 60% of all firms, while those practicing it in the international market comprise 21%. In comparison of domestic outsourcing, offshore sourcing is one third. Nevertheless, it is noteworthy that the number of offshoring firms has increased from 15% to 21% over the period from 2001 to 2006.

2.2 Industry and firm size

The extent of offshoring varies across industries. As illustrated in Table 1, the apparel, general machinery, electric machinery, information and telecommunications, and electronic devices industries exhibit a high ratio of offshoring. These industries are characterized by modularization of parts and intermediate products—a feature that tends to lower the cost to coordinate the performance of unbundled tasks at different sites.

The decision of offshore sourcing is affected by firm size. Table 1 presents that the ratio

of offshoring increases along with an increase in firm size. The ratio of firms that practice offshoring to the total number of firms is 12% for firms with 99 or fewer employees, 21% for firms with more than 100 and less than 300 employees, 34% for firms with more than 300 and less than 1,000 employees, 51% for firms with more than 1,000 and less than 3,000 employees, and 65% for firms with more than 3,000 employees. A similar effect of firm size on offshoring is found across industries. In most industries, 50% of the firms with more than 300 employees are conducting offshore sourcing.

Table 1

2.3 Destination by type of tasks

The destination of Japanese offshoring strongly biased to China and other East Asian countries. More than half of offshored tasks were destined for China. The sum of offshoring to China (52.8%) and ASEAN countries (21.9%) represents three-fourths of all global offshoring. On the other hand, offshoring of tasks to the US and EU comprises only 11.5%.

Table 2 presents what type of tasks tends to be offshored. The two types of task most frequently offshored are the production of intermediate and final assembly, each of which accounts for 35% of offshored tasks. The production of jigs/dies ranks third (13%). Thus, the top three most frequently offshored tasks are all directly related to manufacturing activities. While serious concerns are being raised in the US with regard to the offshoring of services as discussed in Amiti and Wei (2006), in the case of the Japanese manufacturing industry, the offshoring of services is still limited to a small segment of firms. This is despite an increase in the volume of offshoring of manufacturing operations to China[2].

[2] However, it must be taken into account that the low ratio of offshoring in customer support

Table 2

The types of offshored task also vary according to the destination. As shown in Table 3, tasks related to the production of jigs, dies, intermediate products, and final assembly products are offshored largely to China; however, tasks related to R&D and Professional services are offshored to the US and Europe to a significant extent. This suggests that countries with the factor abundance specific to the offshored task have an advantage to receive the task requiring higher intensity of the factor.

Table 3

2.4 In-sourcing vs. outsourcing

Offshored tasks are categorized on the basis of the type of transactions: the division of tasks within firms, i.e., between an MNC and its subsidiaries, and the division of tasks between firms bound by an arm's-length contract. A transaction between MNC and its subsidiary is thought as a transaction within a firm; however, if the transaction is implemented under a contract that specifies the content of tasks, it is appropriate to categorize it under a type of offshoring that falls under the international division of tasks. As Table 2 presents, in terms of offshoring partners firms' own subsidiaries account for 39% of the total offshoring partners; other Japanese firms 15%; and foreign firms 45%. Thus, while the role of subsidiaries as an offshoring partner is significant, the ratio of offshoring to other competitive Japanese firms is relatively low. The third

(4.5%), data utility (3.0%), and professional services (2.1%) may be due to a sample bias toward the manufacturing sector in the Survey.

column in Table 2 presents the share of tasks offshored to own subsidiaries in the case of disaggregated tasks. R&D (55%) and customer support (52%) constitute a significant share of the transactions within multinational firms, followed by final assembly processes (44%). On the other hand, the share of offshoring within firms for professional services (21%), production of jigs and dies (32%), and production of intermediate goods (34%) is lower.

Previous theoretical studies demonstrate that the choice of arm's-length transaction or intra-firm transaction varies according to the characteristics of the task and the specificity of market[3]. Empirical studies, including Feenstra and Hanson (2005), find that the type of supplier and ownership affects the choice of offshoring, contract, or organization. We find that the type of tasks affects the ratio of transactions within firms and that the choice between contracts or organizational transaction relates to the contents of the task.

3. Premia of offshore sourcing[4]

The offshoring of a task comprises its unbundling from the original production process and movement to a place with a lower factor price. Before offshoring, we assume that the production process comprises multiple production stages and that all the stages are carried out at the same location in a country. This implies that the production stages have been bundled into an integrated production process. We find that innovation in ICT or development in air shipping systems enable firms to coordinate production stages at a low cost and then to locate each production stage in different places. In this case, firm can move unskilled-labor intensive production stage from one country to another country where unskilled labor is relatively abundant. We assume that offshoring firms displace the high wage unskilled labor in one country by low wage foreign unskilled labor. Firm can obtain rent caused by wage gap. At the same time, firms are required to

[3] For example, see Grossman and Hart (1986), Hart and Moore (1990), and Antras (2003).
[4] A part of analysis of this section depends on Wakasugi, Ito and Tomiura (2008).

pay additional expenses for coordinating various tasks at remote places. Offshoring is implemented if the net cost saving is positive, i.e., the wage differential exceeds the coordination cost. Thus, factor price differentials and cost of coordinating tasks serve as important factors to determine offshoring of tasks.

Offshore sourcing has an effect to raise the productivity of firm through a change of resource allocation within or between firms. The import of parts and intermediate goods produced in the offshored production stage at a lower cost displaces the task in high wage country. If the workforce employed at the production stage before offshoring is allocated to another production stage with a higher efficiency, the productivity of the firm will rise up. Otherwise, the firm with low productivity exits from the market. In this section, we attempt to analyze the premia of offshore sourcing, in particular the effects on productivity, by using Japanese firm-level data.

Based on our survey of offshore sourcing and the firm-level data of "Basic Survey of Japanese Business Structure and Activity" by Ministry of Economy, Trade and Industry, we calculated the effects of offshoring on the performance of Japanese firms. The result of our examination, as presented in Table 4, finds that in average, firms conducting offshoring recorded 2.5 percent points higher in growth rate of total sales and 1 percent points higher in growth rate of labor productivity than the firms that did not engage in offshoring. The annual growth rate of wage in firms engaged in offshoring was higher than that in firms that did not engage in offshoring by 0.5 percent points. These figures evidence that offshoring has enabled firms to raise their production efficiency. However, it is also notable that offshoring lowers the share of worker's income. In spite of a rise of wage share in non-offshoring firms by 0.1 percent, the wage share in offshoring firms declined by 0.2 percent. This is because of the reduction in the number of workers of offshoring firms and the increase in the number of workers of

non-offshoring firms.

Table 4

Figure 1 shows the labor productivity distributions for the two types of firms: offshore sourcing and non-offshore sourcing firms in Japan. It shows the density that attains each productivity level. The figure depicts the probability of picking a firm with a certain productivity level. It shows that a randomly drawn offshore sourcing firm is likely to be more productive than a randomly drawn non-offshore sourcing firm. We find clearly from the figure that offshore sourcing firms perform better than non-offshore sourcing firms.

Figure 1

4. Impact on productivity

4.1 Analytical framework

We attempt to estimate the impact of offshoring on level and growth of productivity through a standard framework with a Cobb-Douglas production function. Suppose production function of firm *i* at the period *t* as follows:

(1) $$Y_{i,t} = e^{\sigma_{i,t}} K_{i,t}{}^{\alpha} L_{i,t}{}^{\beta} R_{i,t}{}^{\gamma}$$

where *Y* is value added, *K* is capital, *L* is labor, *R* is the stock of technological knowledge, and σ is factors to raise the firm's productivity. As we focus on the impact of outsourcing on labor

productivity in this paper, we rewrite equation (1) as follows[5]:

$$(1') \qquad \frac{Y_{i,t}}{L_{i,t}} = e^{\sigma_{i,t}} K_{i,t}{}^{\alpha} L_{i,t}{}^{\beta-1} R_{i,t}{}^{\gamma}$$

By taking natural logarithm of (1')

$$(2) \qquad \ln \frac{Y_{i,t}}{L_{i,t}} = \sigma_{i,t} + \alpha \ln K_{i,t} + (\beta - 1) \ln L_{i,t} + \gamma \ln R_{i,t}$$

The differential of labor productivity between the period *t* and the period *t-1* is expressed as follows:

$$(3) \qquad \nabla(\ln \frac{Y_{i,t}}{L_{i,t}}) = \nabla \sigma_{i,t} + \alpha \nabla \ln K_{i,t} + (\beta - 1) \nabla \ln L_{i,t} + \gamma \nabla \ln R_{i,t}$$

Expressing $\ln \frac{Y_{i,t}}{L_{i,t}}$ by $y_{i,t}$, $\ln K_{i,t}$ by $k_{i,t}$, $\ln L_{i,t}$ by $l_{i,t}$, equation (3) is rewritten as follows:

$$(3') \qquad \nabla y_{i,t} = \nabla \sigma_{i,t} + \alpha \nabla k_{i,t} + (\beta - 1) \nabla l_{i,t} + \gamma \nabla \ln R_{i,t}$$

As it is difficult to measure the stock of technological knowledge, we use the flow of R&D investment instead of knowledge capital stock. In order to replace the knowledge stock by R&D investment, we rewrite *R* as follows:

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[5] Ito, Wakasugi and Tomiura (2008) address the impact of offshoring on TFP for Japanese firms in another paper.

(4) $$\gamma\nabla \ln R_{i,t} = \gamma \ln(1+\frac{\nabla R_{i,t}}{R_{i,t-1}}) \approx \frac{\partial Y_{i,t-1}}{\partial R_{i,t-1}} \frac{R_{i,t-1}}{Y_{i,t-1}} \frac{\nabla R_{i,t}}{R_{i,t-1}} = \eta \frac{I_{i,t}}{Y_{i,t-1}}$$

where η shows the marginal productivity of technological knowledge, *I* is R&D investment. Here we assume a change of labor productivity between two periods is caused by two factors: the level of labor productivity in the previous period and the effects of offshore sourcing[6]. As for the productivity level, we predict it gradually converge to a certain level among firms. Then, the productivity change is expressed as follows:

(5) $$\nabla \sigma_{i,t} = \sigma_{i,t} - \sigma_{i,t-1} = \delta y_{i,t-1} + \lambda \cdot D_{i,t} + \tau_t$$

where τ_t is constant across firms, D is dummy variable of offshoring such that

$$D_{i,t} = \begin{cases} 1, if \ \ offshoring \\ 0, \ otherwise \end{cases}$$

From the above, we can draw the equation for estimation as follows:

(6) $$y_{i,t} = (\delta+1) y_{i,t-1} + \lambda \cdot D_{i,t} + \alpha \nabla k_{i,t} + (\beta - 1)\nabla l_{i,t} + \eta \frac{I_{i,t}}{Y_{i,t-1}} + \tau_t + \varepsilon_{i,t}$$

The coefficient of dummy variable λ presents the impact of offshoring on labor productivity,

[6] The estimation of labor productivity is based on Loskin et al (2008) and Belderbos, Ito and Wakasugi (2008).

in other words, it means λ perecent points increase in labor productivity[7].

4.2 Data and estimated results

In order to estimate the effect of offshore sourcing on productivity on the basis of firm-level data, we construct the firm-level panel data set by linking our own Survey to the firm-level data in "Basic Survey of Japanese Business Structure and Activity" by Ministry of Economy, Trade and Industry. We use the value-added of firm for Y, the number of employees for L, the book value of tangible assets for K, the R&D expenditure for I from "Basic Survey of Japanese Business Structure and Activity." We conduct the estimation on the random-effects model using the unbalanced panel data of 4800 firms in the two periods of 2000 and 2005, including dummy variables to control industry- specific and year-specific factors[8].

The results of estimation on equation (6), as presented at Table 5, are summarized as follows:

(i) The coefficient of the dummy variable for offshore sourcing is estimated as 0.028 and 0.038 with a statistical significance. According to equation (7), we find that firms with offshore sourcing have a higher productivity by 3 percent than non-offshore sourcing firms.

(ii) The estimated coefficients of such control variables as the labor productivity in the previous period, capital and labor all are statistically significant. The shares of capital and labor are estimated as 0.12 and 0.53, respectively.

(iii) Productivity convergence effect expressed by δ is estimated as -0.18 with a statistical

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[7] $\lambda = (y^{offshore} - y^{non-offshore}) = \ln\left(1 + \frac{\nabla(Y/L)^{offshore}}{(Y/L)^{non-offshore}}\right) \approx \frac{\nabla(Y/L)^{offshore}}{(Y/L)^{non-offshore}}$

[8] Breusch-Pagan Lagrangian multiplier test supports random-effects model rather than OLS on pooling data. Then, we only present the results of estimation on random-effects model.

significance. As we predict δ to fall between 0 and -1, the estimated result is consistent with our theoretical conjecture.

(iv) Marginal productivity of the stock of technological knowledge is estimated as 36 percent, which is significantly high.

Table 5

4.3 Growth of productivity

The estimated results based on equation (6) present only the difference in average productivity between offshore and non-offshore sourcing firms, but do not present the margin of productivity growth between before and after offshore sourcing. I order to refine the effect of offshore sourcing on growth of productivity, we estimate the effect of offshore sourcing on productivity growth realized during five years between 2000 and 2005, by using the difference-in- difference approach expressed by the following equation.

$$(8) \quad y_{i,t} = (\delta + 1) y_{i,t-1} + \lambda_1 \cdot D_i + \lambda_2 T_t + \lambda_3 D_i \cdot T_t + \alpha \nabla k_{i,t} + (\beta - 1) \nabla l_{i,t} + \eta \frac{I_{i,t}}{Y_{i,t-1}}_{t} + \varepsilon_{i,t}$$

where $D_i = \begin{cases} 1, & if \ offshoring \\ 0, & otherwise \end{cases}$ and $T_t = \begin{cases} 1, & if \ t = 2005 \\ 0, & otherwise \end{cases}$

The interaction term between dummy variable for offshore sourcing and dummy variable for the year 2005 presents the marginal effect of offshore sourcing on productivity growth.

Estimation is carried out, based on the random-effects model using the unbalanced panel data of 3200 firms with non-offshore sourcing in 2000 and offshore or non-offshore

sourcing in 2005, including dummy variables to control industry-specific factor[9]. The results of estimation, as presented at Table 6, show that the effect of offshore sourcing on productivity growth is 0.05 with a statistical significance of 5 percent. In other words, offshore sourcing raises the productivity by 5 percent *ceteris paribus.*

Table 6

5. Conclusion: policy issues

In the recent 10-years, offshore sourcing of Japanese firms to East Asian countries has rapidly increased. Our survey on Japanese offshoring presents that 20 percent of Japanese companies in total are performing offshore sourcing and more than 50 percent of companies with 300 or more employees are conducting offshore sourcing in China and other East Asian countries mainly for the tasks of their manufacturing parts and intermediate goods or assembling final goods. It is predictable that such an increase of offshoring stimulates the exit of firms with low efficiency from the market and raises the productivity of existing firms through a change of resource allocation within or between Japanese firms. As estimated in the previous studies using EU, US or other country firm-level or industry-level data, our empirical estimation based on the Japanese firm-level data presents a clear evidence that the productivity differs by 3 percent between offshoring and non-offshoring firms and offshoring raises the productivity by 5 percent *ceteris paribus*.

Offshore sourcing is carried out if the benefit of factor price differential exceeds the cost for coordinating unbundled tasks in different locations in material and service production. As trade cost is included in coordination cost, advancing more liberalization of the trade among

[9] In this case also Breusch-Pagan Lagrangian multiplier test supports random-effects model rather than OLS on pooling data.

East Asian countries leads to a reduction of trade cost and promotes offshoring, and consequently raises the efficiency of East Asian economy. For this reason, trade liberalization in East Asia provides a favorable condition for raising the productivity in the region.

As Baldwin (2006) suggests, it is predictable that offshore sourcing accompanies a rapid and large-scale movement of employment and adjustment of industry structure. In fact, Table 4 presents the reduction in the number of workers of offshoring firms and the increase in the number of workers of non-offshoring firms. It becomes important to prepare the new job opportunity displacing the job opportunity lost by offshoring in order to accomplish full employment of resources. To cope with such adjustment problem, appropriate policy is needed for supplying the education and training program suitably fitting to the changing job opportunity and realizing the smooth reallocation of workers. They are indispensable to avoid unemployment friction caused by offshoring.

For such policy formation, the sufficient supply of statistical data is necessary for understanding precisely offshore sourcing and changing job structure. The current trade data at commodity-level or industry-level do not supply sufficient information for dissecting the problems that the offshore sourcing accompanies. Internationally comparable data including not only firm-level production data but also firm-level trade data by production stage across countries will provide a good foundation for the further analysis of offshoring and related policy issues.

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Table 1. Offshoring by industry and size

	Total	Number of employees				
		-99	100-299	300-999	1000-2999	3000-
Total	21%	12%	21%	34%	51%	65%
Foods	10%	4%	9%	19%	21%	20%
Textile	12%	6%	13%	43%	0%	0%
Apparel	37%	31%	37%	50%	0%	100%
Chemicals	19%	5%	17%	21%	60%	100%
Machinery	32%	21%	34%	56%	53%	100%
Electric Machinery	32%	17%	32%	46%	58%	100%
Information and Telecommunications	35%	23%	24%	47%	86%	80%
Electronics and Devices	31%	16%	25%	46%	73%	100%
Transportation Machinery	22%	10%	17%	32%	59%	60%

Data source: Author's survey. See Ito, Tomiura and Wakasugi (2007)

Table 2. Disaggregation of offshoring by type of task and shares of own subsidiaries, other Japanese subsidiaries and foreign-owned suppliers

Type of Task	Share of tasks	Share of own subsidiaries	Other Japanese subsidiaries	Foreign-owned suppliers
Jigs/Dies	12.52	32.43	2.19	6.27
Intermediates	35.34	33.73	6.24	17.17
Final Assembly	35.25	44.11	4.74	14.96
R & D	3.58	54.75	0.28	1.33
Info services	3.01	36.88	0.60	1.31
Customer support	4.51	52.33	0.62	1.53
Professional services	2.13	21.13	0.31	1.36
Other tasks	3.66	47.27	0.43	1.50
Total	100.00	39.14	15.41	45.44

Source: Author's survey. See Ito, Tomiura and Wakasugi (2007).

Note: The column of share of tasks shows the percent of each task to total offshoring across the tasks and the columns of share of own subsidiaries, other Japanese subsidiaries and foreign-owned suppliers show the percent of offshoring to own subsidiaries, other Japanese subsidiaries and foreign-owned suppliers to total offshoring respectively, by type of task

Table 3. Destination of offshoring by type of task

Task	World Total	By region				
		China	ASEAN	Other Asia	U.S.A. & Europe	ROW
Jigs/Dies	12.52	7.35	2.64	1.93	0.51	0.09
Intermediates	35.34	19.19	7.61	4.37	3.32	0.85
Final Assembly	35.25	19.56	8.57	3.52	2.92	0.68
R & D	3.58	1.22	0.45	0.4	1.39	0.11
Info services	3.01	1.28	0.65	0.2	0.79	0.09
Customer supports	4.51	1.79	0.91	0.51	1.16	0.14
Professional services	2.13	0.71	0.37	0.31	0.65	0.09
Other tasks	3.66	1.7	0.71	0.34	0.71	0.2
Total	100	52.8	21.91	11.58	11.47	2.24

Data source: Author's calculation. See Ito, Tomiura and Wakasugi (2007) in detail
Note: Shown are the percentages in the total number of offshoring cases. The offshoring of the same category of tasks to the same type of suppliers in the same region is counted as one offshoring case even if multiple transactions are involved.

Table 4. Difference in annual growth rate of value added, labor productivity, wage rate and the share of wage between offshoring and non-offshoring firms over the period of 2000 and 2005

	Type of firms	
	Non-offshoring	Offshoring
Total sales	−0.40%	2.10%
Labor productivity	−0.20%	0.80%
Wage rate	−0.20%	0.30%
Wage share	0.10%	−0.20%

(Source) Author's calculation.
(Note) Each figure presents average annual growth rate over the period from 2000 to 2005.

Table 5. Results of estimation (1)

	(1)	(2)
lnY/L_1	0.811	0.812
	[0.007]**	[0.007]**
Dummy for offshoring	0.038	0.028
	[0.009]**	[0.009]**
dlnK	0.116	0.116
	[0.007]**	[0.007]**
dlnL	-0.475	-0.474
	[0.017]**	[0.017]**
I/Y_1		0.358
		[0.041]**
Industry dummy	Yes	Yes
Year dummy	0.0001	0.0001
	[0.006]	[0.006]
Constant	0.53	0.512
	[0.016]**	[0.016]**
Observations	8015	8015
Number of id	4818	4818
R^2: within	0.517	0.516
between	0.766	0.768
overall	0.737	0.740
Breusch-Pagan Lagrangian multiplier test (pooling vs random effects)	chi-sq = 21.9 Pr>chi-sq = 0.000	chi-sq = 21.4 Pr>chi-sq = 0.000

Note: Standard deviation between brackets. * and ** present 5% and 1% of statistical significance level, respectively.

Table 6. Results of estimation (2)

	(1)	(2)
lnY/L_1	0.809	0.808
	[0.007]**	[0.007]**
Dummy for offshoring group	0.017	-0.011
	[0.014]	[0.019]
Dummy for offshoring group× dummy for the year 2005		0.054
		[0.023]*
Dummy for the year 2005	0.001	-0.003
	[0.006]	[0.006]
dlnK	0.122	0.122
	[0.008]**	[0.008]**
dlnL	-0.479	-0.479
	[0.021]**	[0.021]**
I/Y_1	0.387	0.387
	[0.048]**	[0.048]**
Industry dummy	Yes	Yes
Constant	0.513	0.516
	[0.018]**	[0.018]**
Observations	5903	5903
Number of id	3207	3207
R^2: within	0.493	0.494
between	0.802	0.802
overall	0.745	0.745
Breusch-Pagan Lagrangian multiplier test (pooling vs random effects)	chi-sq = 21.1 Pr>chi-sq = 0.000	chi-sq = 21.7 Pr>chi-sq = 0.000

Note: Standard deviation between brackets. * and ** present 5% and 1% of statistical significance level, respectively.

Figure 1. Productivity distribution of offshore and non-offshore sourcing firms