

The Exchange Rate and the Performance of Japanese Firms:  
A Preliminary Analysis Using Firm-level Panel Data<sup>†</sup>

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**Abstract**

Using a large firm-level panel dataset covering about 360,000 Japanese firms from the mid-1990s to FY2013, this paper presents the results of a fact finding study examining the effects of exchange rate changes on the performance of Japanese firms, especially in recent years. While our results are very preliminary, we first confirm that yen depreciation has a positive effect on the performance of Japanese firms (through the sales channel) in general, and, as expected, it is export-oriented large and medium-sized firms that benefit the most. Though our findings on their own cannot substantiate the view that the yen depreciation caused the strong performance of firms, the firm performance in 2013 is grossly in line with or an extension of the estimated relationship between the yen rate and the performance of Japanese firms in the past 20 years. Moreover, we find that, for some reason, the positive effect of yen depreciation on the exporting firms was smaller in 2013 than in previous years, but our preliminary analysis did not produce evidence supporting the hypothesis that exporting firms' overseas transfer of production is reducing their gains from yen depreciation.

JEL classification: F31, F62, L25

Keywords: Sales growth, ROA, Exchange rate, Globalization

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## 1. Introduction

In order to pull the Japanese economy out of prolonged deflation and stagnation, the Prime Minister, Shinzo Abe, introduced a set of policies in December 2012 summarily referred to as ‘Abenomics.’ Abenomics consists of three arrows: unconventional monetary policy (the first), expansionary fiscal policy (the second), and economic growth strategies to encourage private investment (the third arrow). The first two of the ‘three arrows’ were implemented quickly, while the third arrow (structural reforms) is in the process of implementation and expected to take time before effects appear. The stock and foreign exchange markets reacted very favorably to the new policy (see Figure 1(a) and 1(b)).<sup>1</sup> The real economy (Japan’s macro fundamentals) is also showing some signs of improvement.

While markets tend to react favorably when they expect a recovery in terms of macro fundamentals, the timing of events since the introduction of Abenomics appears to suggest that the improvements in Japan’s macro fundamentals likely are the result of the market response rather than the other way around. The purpose of this paper is to investigate the effects of exchange rate changes (one of the two market reactions mentioned above) on the performance of Japanese firms. In a zero interest rate environment, in which traditional ways to directly influence the course of the economy through monetary policy are not necessarily available, currency depreciation turns out to be the most tangible channel through which to stimulate private business activity.<sup>2</sup>

Despite the historical fact that developments in Japan’s economy are closely linked with trends in the exchange rate of the yen (see Figure 1(c)), not everyone welcomes a weaker yen, with some arguing that it makes it difficult for smaller firms mainly serving the domestic market to pay for more expensive foreign goods. Some argue that even exporting firms are not benefitting much,

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<sup>1</sup> Fukuda (2015) investigates why the two markets reacted to Abenomics so favorably, and reports that the dramatic market responses under Abenomics happened only in time zones when foreign investors were active.

<sup>2</sup> Shioji (2015) argues that the currency depreciation since December 2012 could turn out to be useful for ending Japan’s long battle with falling prices.

since many of them have shifted substantial parts of their production overseas. Although only time will tell, many economists expect that the volume of exports by Japanese firms will not increase very much, since they have not cut their export prices in dollar terms (raise them in yen terms) despite the falling value of yen (see Figure 2).<sup>3</sup>

Against this background, this paper presents the results of a microdata based fact finding study examining the effects of exchange rate changes on the performance of firms in Japan. While there is a substantial literature on the implications of exchange rate swings for the real economy in other countries,<sup>4</sup> and despite its important policy implications, there is little firm-level evidence on the effect exchange rate changes on the performance of Japanese firms, except for a study on Japanese firms' investment by Hotei (2012).<sup>5</sup> Basing on a large firm-level panel dataset of 359,000 non-financial firms (2.2 million total observations) in Japan from FY1994 to FY2013, this paper investigate the relationship between the real effective exchange rate and Japanese firms' performance.

There are at least a few reasons to think that a firm-level study is appropriate for studying the relationship between exchange rate and firms' performance. Exchange rate changes could affect firm performance through a number of different channels, such as the price of exports relative to foreign competitors, the cost of imported inputs relative to other factors of production, or the cost of internal/external borrowing, etc. Since these channels are expected to work differently on firms with different characteristics, a firm-level data based analysis, enriched with detailed information about firms' characteristics, permits a better understanding of the transmission channels. A firm-level panel based analysis also allow us to control for unobservable individual effects, which are likely to be

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<sup>3</sup> Basing on the auto-regressive distributed lag model as well as time-varying parameter estimation of exchange rate pass-through in Japanese exports, Shimizu and Sato (2015) argues that the slow recovery of Japanese trade balance in response to the yen depreciation can be explained by Japanese firms' pricing behavior as well as the active overseas operation caused by the unprecedented level of yen appreciation before Abenomics.

<sup>4</sup> See, for example, Baggs et al. (2009) for a study on Canadian firms, Nucci and Pozzolo (2001, 2010) for studies on Italian firms, Fung and Liu (2009) for a study on Taiwanese firms, and Dhasmana (2013) for a study on Indian firms.

<sup>5</sup> If we widen our scope to studies that used aggregated or sectorial data, there appears to be more studies on Japan available. See Matsubayashi (2011) as an example.

correlated with firm's response to exchange rate fluctuations.

While the findings of this paper are very preliminary, constrained by the short observation period after the start of Abenomics, we could confirm that yen depreciation generally has a positive effect on the performance of Japanese firms through sales channel, and that it is large export-oriented firms that benefit the most. Favorable performance of Japanese firms in 2013 was grossly in line with or an extension of the estimated reduced form relationship between the yen rate and the performance of firms in Japan in the past 20 years. Moreover, we find that, for some reason, the positive effect of yen depreciation on the exporting firms was smaller in 2013, but our preliminary analysis did not produce evidence supporting the hypothesis that exporting firms' overseas transfer of production is reducing their gains from yen depreciation in recent years.

The remainder of the paper is organized as follows. Section 2 describes the firm-level dataset used in this study and its two data sources, i.e. the *Basic Survey of Japanese Business Structure and Activities (BSBSA)* and the *Orbis* database. Next, Section 3 briefly explains our empirical methodology to examine the effects of exchange rate changes on the performance of firms in Japan. Section 4 then presents the results, while Section 5 summarizes the findings and lists up issues left for the future research.

## **2. Datasets and summary statistics**

To examine the effects of exchange rate changes on the performance indicators (sales growth & ROA) of Japanese firms from the mid-1990s to FY2013, we used the following two firm-level panel datasets:

### *Basic Survey of Japanese Business Structure and Activities (BSBSA)*

The Ministry of Economy, Trade and Industry (METI) conducts this survey once a year to acquire a

quantitative understanding of the actual conditions and activities of Japanese enterprises, and to obtain basic data for the implementation of industrial policies. The survey each year covers about 30,000 enterprises with 50 or more employees and paid-in capital of over 30 million yen. We were able to obtain the *BSBSA* microdata from 1994 to 2012.

#### *Orbis* database

*Orbis* is a product of Bureau van Dijk Electronic Publishing, a world leading firm of private company information, and contains information on over 160 million companies worldwide. We were able to obtain the information on Japanese firms in *Orbis* (roughly about 200,000 firms every year) from 2004 to March 2014.

While *Orbis* has the advantage that it provides a larger sample and more recent coverage, it goes back only to the mid-2000s and does not cover detailed information on firms' global activities such as their international trade, overseas operations, etc. To take advantage of the *BSBSA*'s long coverage (from the mid-1990s) and the rich information on firms' global activities, we basically use the *BSBSA* microdata to analyze the performance of large and medium-sized firms. We use the *Orbis* database simply to extend the sales and ROA data to FY2013 and to widen the coverage of our analysis to include small firms (with fewer than 50 employees), assuming that smaller firms' international trade and overseas operations were negligible.

The number of observations examined is roughly 2.2 million, covering 359,000 firms in total, which consist of 46,000 (large and medium-sized) firms in the *BSBSA* and 314,000 (small) firms in *Orbis*. The basic statistics of the sample are reported in Table 1. We classified our sample firms into three size categories based on the number of regular employees: 300 or more (large firms), 50 to 299 (medium-sized firms), and fewer than 50 (small firms); and four industrial categories:

manufacturing, wholesale & retail, construction, and others. Comparing firms' average performance indices during FY1995-FY2013 period by firm size, we see that larger firms performed slightly better than medium-sized firms (see the BSBSA result in Table1-2-(1)). While we cannot strictly compare the performance of small firms with that of large and medium-sized firms since their sample periods are different, the performance of the small firms does not look as good as that of the larger firms. Table 1-2-(2) compare the performance indices between the average of FY2011-FY2012 and that of FY2013, in order to see how firms' performance were different in FY2013 from previous years. We can see the average sales growth in FY2013 are higher than that of FY2012-FY2011 regardless of firm size or industry. As for ROA, we can confirm better performance in FY2013 for our small firm observations, though we do not see a noticeable improvement in the profit rate for our large and medium-sized firms.

To further examine the situation in 2013 (i.e., after the start of Abenomics) with preceding years, Figure 3 presents kernel densities of the distributions of performance indicators by year (4th quarter). The estimated distributions indicate that in terms of firms' sales growth (from the previous year) and ROA, 2013 was among the best years in the past decade. On the other hand, the level of firms' sales has only just recovered from the slump in the wake of the global financial crisis.

Comparing the performance of large and medium-sized firms vs. small firms (Figure 3.2), while the performance of indices for small firms vary widely as expected, we can see the favorable performance in 2013 not only for large and medium-sized firms but also for small firms. Comparison between exporting firms and importing firms (Figure 3.3) suggests that the differences in the 2013 performance between them are not as outstanding as they were anticipated. Finally, Figure 3.4, which compares the performance between firms inside and outside large cities, shows that firms are performing relatively well in 2013 regardless of firm's location.

In order to more formally investigate the causes of the observed favorable business

conditions, we run microdata-based reduced-form regressions in the following sections.

### 3. Empirical strategy

To empirically examine the impact of exchange rate changes on firms' performance, we run the following reduced-form regressions for firm performance variable  $z$ , where  $z$  is either the log of firms' sales or ROA:

$$\begin{aligned}
\Delta z_{i,t} = & \alpha + \sum_{k=0,1,2} \beta_{1,k} \Delta \ln EER_{t-k} \\
& + \sum_{k=0,1,2} \beta_{2,k} \Delta \ln EER_{t-k} * ((X_i - M_i) / S_i) * TSDum_i + \sum_{k=0,1,2} \beta_{3,k} \Delta \ln EER_{t-k} * ((X_i - M_i) / S_i) * (1 - TSDum_i) \\
& + \gamma_1 \Delta \ln DR_{t-12} + \gamma_2 \Delta \ln DU_{t-12} \\
& + \gamma_3 \Delta \ln DW_t + \gamma_4 \Delta \ln DW_t * XDum_i + \gamma_5 \Delta \ln DE_t + \gamma_6 \Delta \ln DE_t * XDum_i \\
& + \sum_{k=0,1,2} \rho_{1,k} \Delta \ln POIL_{t-k} + \sum_{k=0,1,2} \rho_{2,k} \Delta \ln POIL_{t-k} * MDum_i + \varepsilon_{i,t}
\end{aligned} \tag{1}$$

where  $EER_t$  is the real effective exchange rate at period  $t$ , expressed in terms of foreign currency units per yen, so that an increase in the rate amounts to a yen appreciation (see Appendix at the tail of this paper for the definitions of variables and data sources).  $(X_i - M_i) / S_i$  is the size of firm  $i$ 's trade surplus relative to its sales. We include  $TSDum_i$ , a dummy variable that takes 1 when  $(X_i - M_i) > 0$  holds for firm  $i$ , to allow for asymmetric responses between firms with trade surplus and firms with trade deficit. As control variables, we include the annual growth rates of domestic private demand ( $DR_t$ ), domestic public demand ( $DU_t$ ), the US and European economies ( $DW_t$ ), and Asian economies ( $DE_t$ ), as well as rate of change of the oil price ( $POIL_t$ ).  $XDum_i$  and  $MDum_i$  are dummy variables that take 1 if firm  $i$  exports or imports, respectively.

If yen depreciation has a positive effect (after controlling for other factors) on the performance of Japanese firms (regardless of whether they are exporters or importers, or both, or none), the coefficient  $\beta_{1,k}$  is expected to be negative. If firms with a trade surplus (deficit) are affected more positively (negatively) from yen depreciation,  $\beta_{2,k}$  ( $\beta_{3,k}$ ) is also expected to be negative. If impacts on the trade surplus firms and those on the trade deficit firms are symmetric,

$\beta_{2,k} = \beta_{3,k}$  holds true. As for the demand-related control variables, we generally expect that the coefficient  $\gamma_j$  should be positive. While changes in the oil price are expected to have a negative effect ( $\rho < 0$ ) on firms' ROA, the effects on sales growth are uncertain, since a higher oil price may cause some increases in sales prices.

Further to see whether the effects of exchange rate changes on firms' performance differ across firms with different characteristics, we would compare (1) large vs. medium-sized vs. small firms, and (2) manufacturing vs. wholesale and retail vs. ... (in section 4.2). We also try the following expanded regressions to check whether the effects of yen depreciation in FY2013, under Abenomics, were different from those observed in the past (section 4.3):

$$\begin{aligned}
\Delta z_{i,t} = & \alpha + \sum_{k=0,1,2} \beta_{1,k} \Delta \ln EER_{t-k} \\
& + \sum_{k=0,1,2} \beta_{2,k} \Delta \ln EER_{t-k} * ((X_i - M_i) / S_i) * TSDum_i + \sum_{k=0,1,2} \beta_{3,k} \Delta \ln EER_{t-k} * ((X_i - M_i) / S_i) * (1 - TSDum_i) \\
& + \beta_4 \Delta \ln EER_t * D2013_t \\
& + \beta_5 \Delta \ln EER_t * ((X_i - M_i) / S_i) * TSDum_i * D2013_t \\
& + \beta_6 \Delta \ln EER_t * ((X_i - M_i) / S_i) * (1 - TSDum_i) * D2013_t \\
& + \dots + \varepsilon_{i,t}
\end{aligned} \tag{2}$$

$D2013_t$  is a dummy variable that takes 1 if period  $t$  belongs to fiscal year 2013.  $\beta_4$ ,  $\beta_5$  and  $\beta_6$  will be significantly different from zero if the patterns in 2013 were different from those in the previous years.

In section 4.4, we will further examine the relationship between the effects of exchange rate changes and the global activities of Japanese firms. The globalization of Japanese firms advances rapidly, as reflected in the hike of export/import shares in total firm sales, in increasing firms' overseas operations, as well as in the upward trend of Japanese firms' investment and loans to their overseas affiliated firms (see Figure 4). Therefore it is reasonable to assume that the effect of exchange rate changes on the performance of firms changes under their influences. We will specifically examine (1) how the profits (in foreign currency terms) of firms' overseas business are



reflected in the performance of Japanese firms; and (2) how the accelerating shift to overseas production is changing the pattern of (exporting) Japanese firms' gains from yen depreciation.

#### 4. Empirical findings

##### 4.1 General evaluation

The results of our baseline regression are reported in Table 2 (all estimated coefficients reported in tables of this paper are from median regressions). We first run the regression using the sample of large and medium-sized firms from the *BSBSA*, about 450,000 observations (45,000 firms). We also run regressions using an extended dataset with smaller firms from the *Orbis* database, about 1.7 million observations (350,000 firms). Despite the difference in sample size between the *BSBSA* dataset and the extended dataset, the obtained parameters generally look very similar for the two datasets.

The parameters obtained follow the expected patterns in general. As for the effects on “Sales growth,” i) the sales of Japanese firms (regardless of whether they are exporters or importers, or both, or none) increase significantly when the yen depreciates ( $\beta_{1,k} < 0$ ); a 30% depreciation of the yen, roughly equivalent to a yen depreciation after the start of Abenomics, results in a 3.9 ( $=0.129 \times 0.3 \times 100$ ) % increase in firms' sales; ii) the positive effects of a yen depreciation are significantly larger not only for firms with a trade surplus ( $\beta_{2,k} < 0$ ) but also for firms with a trade deficit ( $\beta_{3,k} > 0$ ); iii) the demand-related control variables enter the sales regression as expected ( $\gamma_j > 0$ ); and iv) an oil price increase leads to an increase in Japanese firms' sales ( $\rho > 0$ ), probably due to some sales price increases.

As for the effects on “ROA,” i) the ROA of Japanese firms increases in the year that the yen depreciates ( $\beta_{1,0} < 0$ ); a 30% depreciation of the yen results in a roughly 0.3% increase in

firms' ROA; ii) while the (positive) effect in the year of yen depreciation is significantly larger for firms with a trade surplus ( $\beta_{2,k} < 0$ ), that for firms with a trade deficit is significantly smaller or even turns to negative ( $\beta_{3,k} < 0$ ); inversion of sign on coefficient  $\beta_{3,k}$  from positive in the sales regressions to negative in the ROA regressions suggests that the sales increase observed for importing firms is not enough to cover the cost increase due to a yen depreciation; iii) the demand variables enter the ROA regressions positively ( $\gamma_j > 0$ ); and iv) an oil price increase leads to a lower ROA of Japanese firms ( $\rho < 0$ ), as expected.

#### 4.2 Comparison by size and industry

Table 3 reports the results of the regressions by firm size. While we see some minor differences between large and medium-sized firms, the estimated coefficients look generally the same as those reported in Table 2 (our baseline result). However, the coefficients for small firms are quite different from those for the larger firms. Among other things, 1) the positive effects of a yen depreciation look grossly negligible for small firms, and 2) the sales of small firms are negatively affected by an increase in the oil price.

Table 4 reports the results of the regressions by industry (and firm size). The positive sales effects of a weaker yen are most pronounced for large/medium-sized (exporting) manufacturing firms. However, positive sales effects can also be observed for large/medium-sized firms in other industries and small firms in non-manufacturing industries. While the ROA of exporting large/medium-sized firms are affected positively by yen depreciation, those of importing firms are sometimes affected negatively, and the ROA gains for small firms look largely negligible.

#### 4.3 Effects in 2013

Table 5 reports the regression results examining whether the impact of yen depreciation in 2013 differed from that in the past. We find (in Table 5(a)) a negative and significant coefficient ( $\beta_4 < 0$ ) on the cross-term, which potentially suggests that the positive impact of a yen depreciation was larger in 2013. However, it is also possible that Japanese firms performed well in 2013 for other reasons that are not controlled in our reduced-form regressions. We tried various alternative regressions to exclude the effects of other factors such as the surge in demand before the consumption tax rate increase in April 2014 and increases in public spending under Abenomics (see Table 5(b)), but the estimated coefficient ( $\beta_4$ ) is not greatly affected.

Another finding is that the positive effects of yen depreciation on the performance (sales growth, ROA) of firms with a trade surplus in 2013 were significantly smaller ( $\beta_5 > 0$ ) than in previous years. The smaller gain from yen depreciation for exporting firms is consistent with our macro-based finding that the export volume overall has not increased much in 2013 despite yen depreciation.

In sum, while Japanese firms appear to have been favorably affected by the depreciation of the yen in 2013, the channel through which they did so seems to have shifted away from the classical boost to export.

#### 4.4 Exchange rate effects and globalization

Finally, Table 6 reports the results examining the relationship between the effects of exchange rate changes and the globalization of Japanese firms.

We first extended our regression specification to include cross-terms to see whether the positive effect of yen depreciation is larger for firms with overseas business establishments. Yen depreciation is expected to have a positive effect on the sales and profits of Japanese firms with overseas business, since the yen value of their overseas sales and profits increases with a

depreciation of the yen. The results reported in Table 6(a) support this conjecture; at the same time, the effect of yen depreciation remains positive even after controlling for these factors (and even for firms without exports).

We also examined whether the smaller gains for exporting firms in 2013 (reported in Table 5) result from Japanese firms' globalization (i.e., from the transfer of production overseas). If the smaller gains for exporting firms in 2013 are due to changes in the behavior of firms that transferred production overseas, the inclusion of a cross-term with a dummy for firms that transferred production should reduce the significant positive coefficient ( $\beta_5 > 0$ ) in Table 5. Although the hypothesis that the transfer of production is reducing the gains from yen depreciation has gained wide currency and sounds plausible, our result (the coefficient on the cross-term with the overseas transfer enhancement dummy in Table 6(b)) appears not to support it. As firm-level export data for 2013 is not yet available, we unfortunately need to wait another year to settle this issue.

## **5. Concluding remarks**

The purpose of this paper was to examine the effects of exchange rate changes on the performance of Japanese firms, especially in recent years. While our results are very preliminary, the findings can be summarized as follows:

- (1) The sales growth and ROA of Japanese firms in FY2013 were among the best in the past decade, irrespective of firm size or location of the firm;
- (2) Yen depreciation appears to have a positive effect on the performances of Japanese firms through the sales channel in general, and it is large exporting firms that benefit the most as expected;
- (3) In contrast, yen depreciation affects ROA of importing firms negatively through the cost channel;
- (4) The firm performance in 2013 is grossly in line with or an extension of the estimated relationship between the yen rate and the performance of Japanese firms in the past 20 years, while our

findings on their own cannot substantiate the view that the yen depreciation caused the strong performance.

- (5) The positive effect of yen depreciation on the exporting firms appears to be smaller, for some reason, in 2013, though our analysis do not produce evidence supporting the hypothesis that firms' overseas transfer of production is reducing their gains from yen depreciation.

The findings reported in this paper are very preliminary, so further analyses are necessary to arrive at firmer conclusions. We first would like to note that our analysis lacks a strong theoretical foundation, which are necessary to provide a firmer basis for our analysis. One promising direction would be to examine the relationship between firms' participation in global supply chains and exchange rate effects. (For this purpose it would be more fruitful to focus on a sample of firms with certain characteristics, while the current study cast its net wider, covering all firms.) Secondly, our observation period is too short to evaluate the impact of Abenomics. As time goes by, extending our observation period to cover one more year will help to obtain firmer and richer conclusions. Finally, it would also be fruitful to conduct similar studies on firms in other countries to draw more general conclusions that apply not only to Japan, but more broadly.

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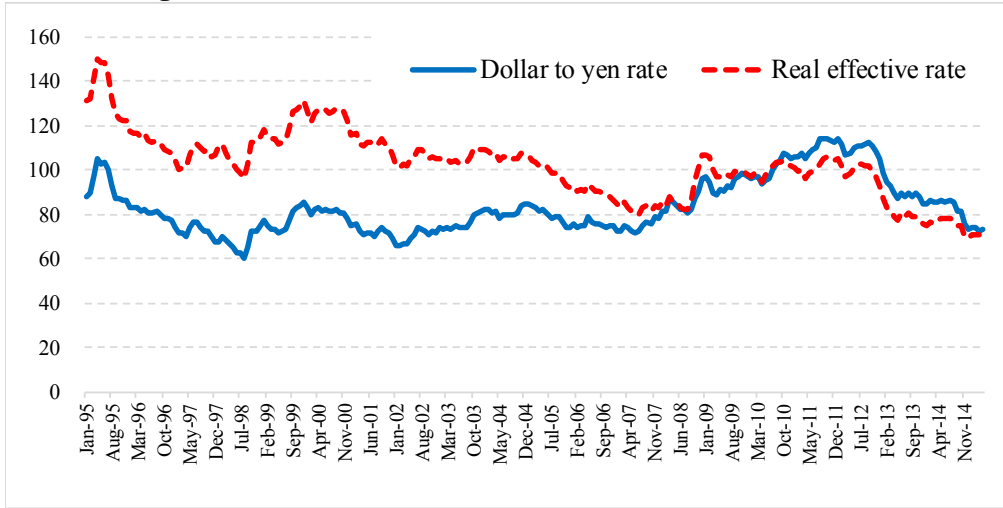
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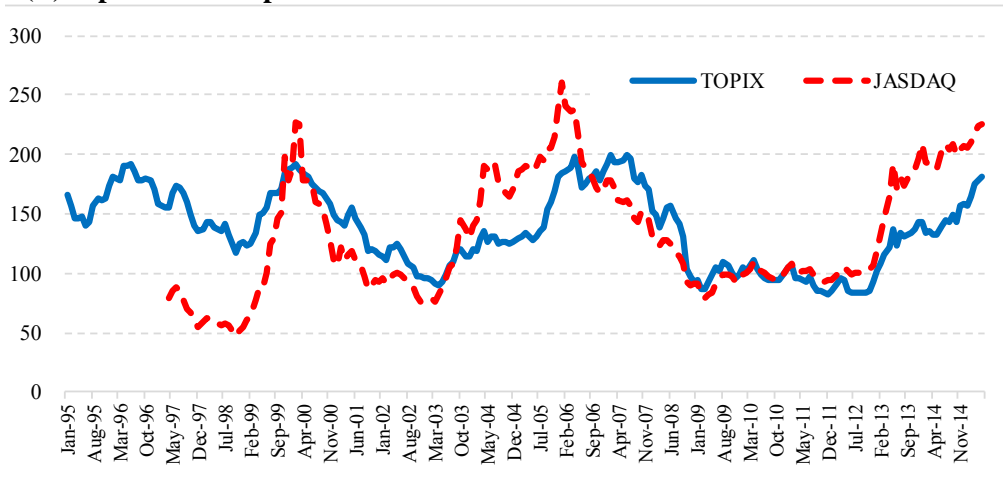
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**Figure 1. Developments in macroeconomic indicators for Japan (2010=100)**

**1(a) Exchange rates**



**1(b) Japanese stock price indices**



**1(c) Real effective exchange rate, shipments, and operating profit**

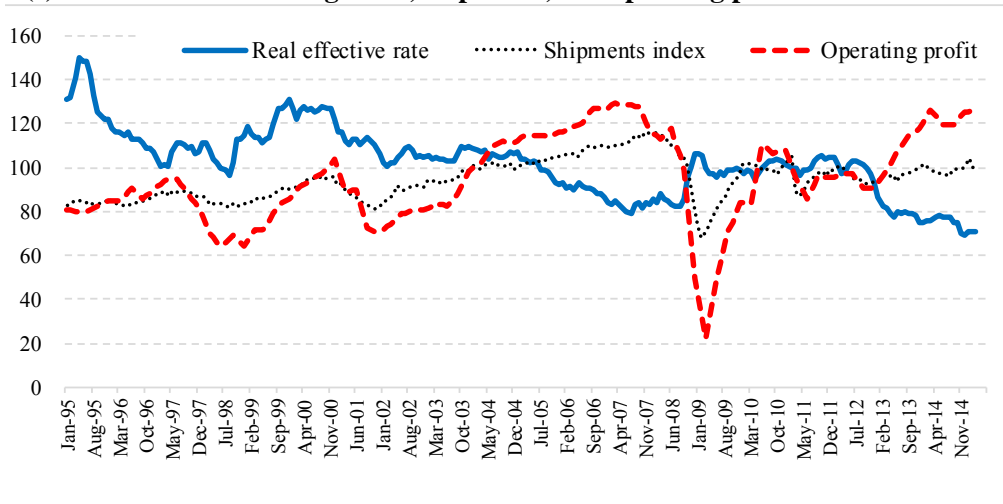
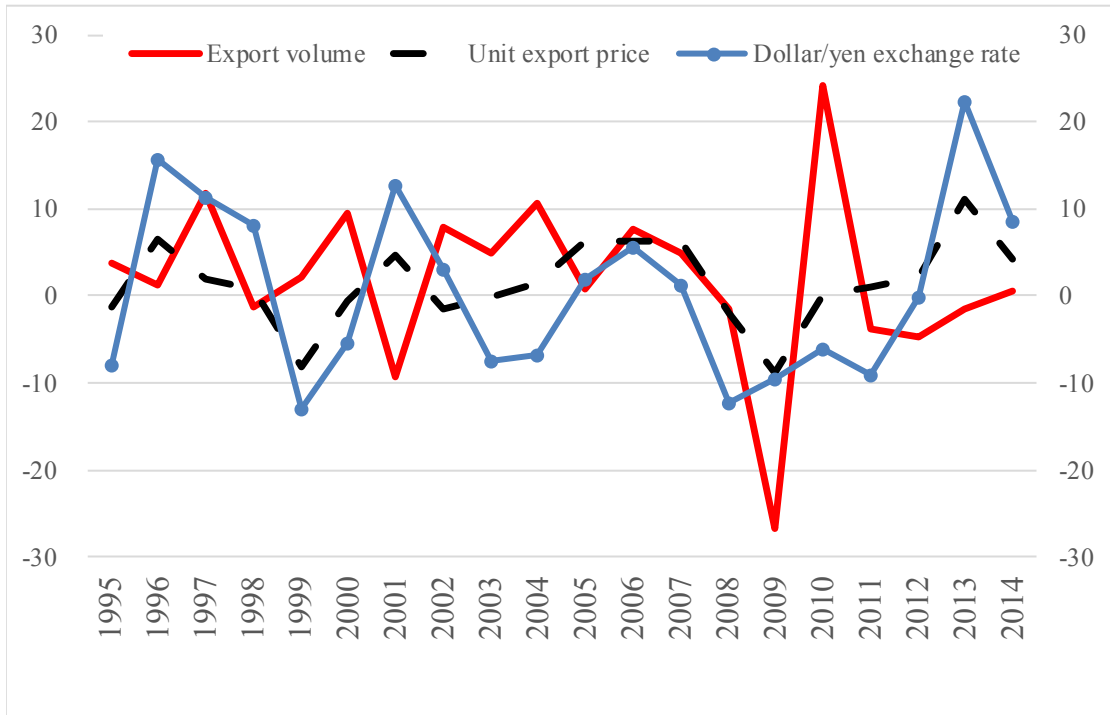


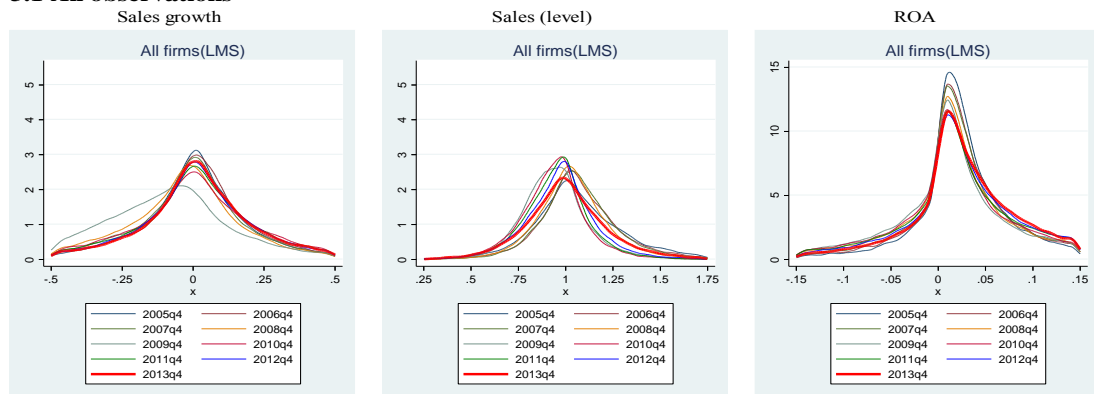
Figure 2. Annual percent changes in the dollar/yen exchange rate and trade indicators





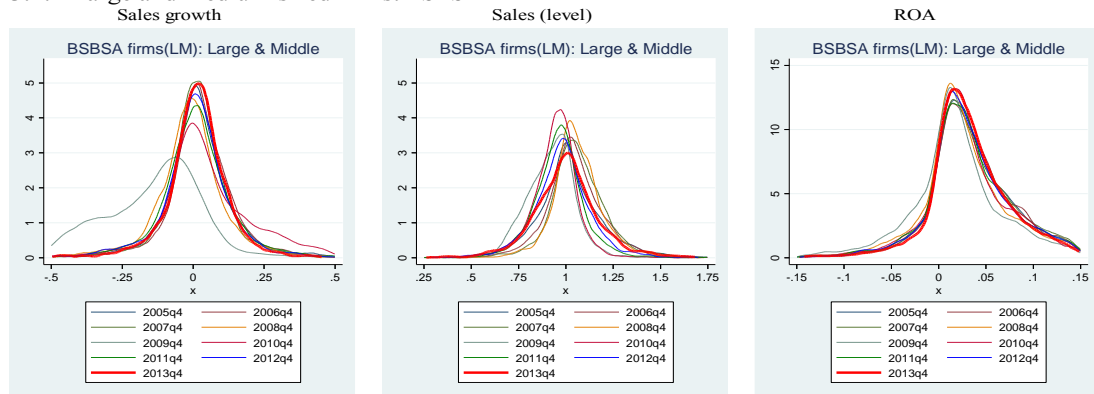
**Figure 3. Kernel density of performance indicators by year (4th quarter)**

**3.1 All observations**

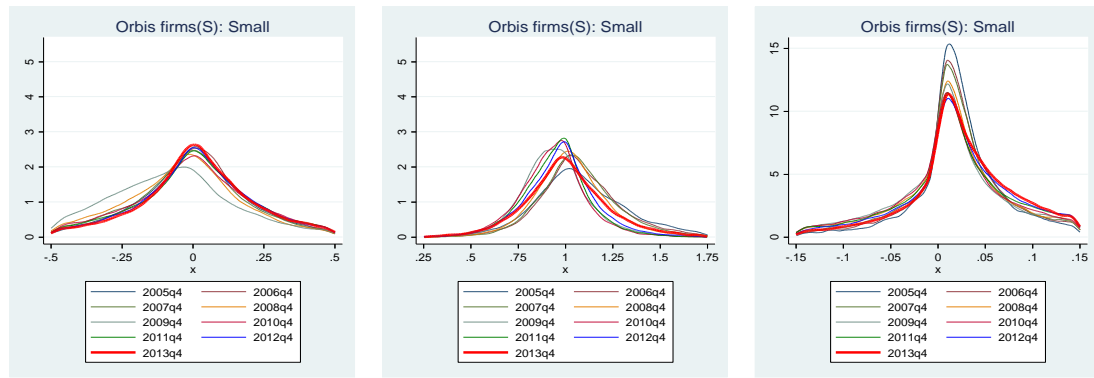


**3.2 Large & medium-sized firms vs small firms**

**3.2.1 Large and medium-sized firms: BSBSA**



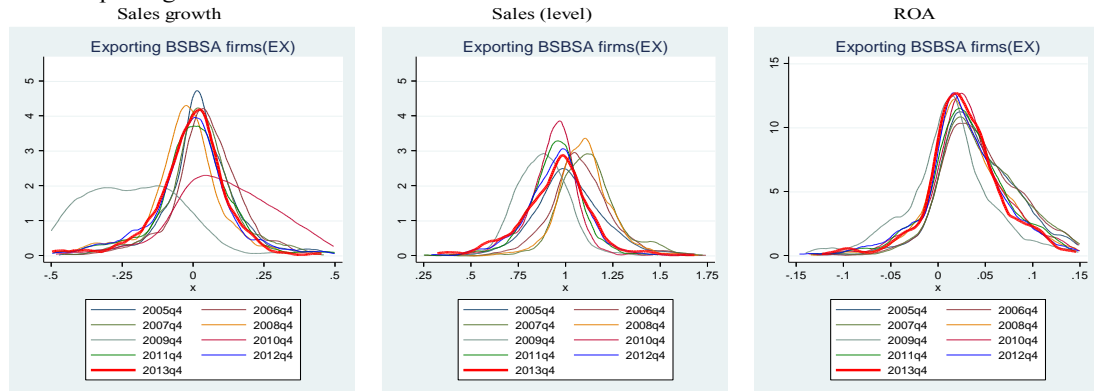
**3.2.2 Small firms: Orbis**



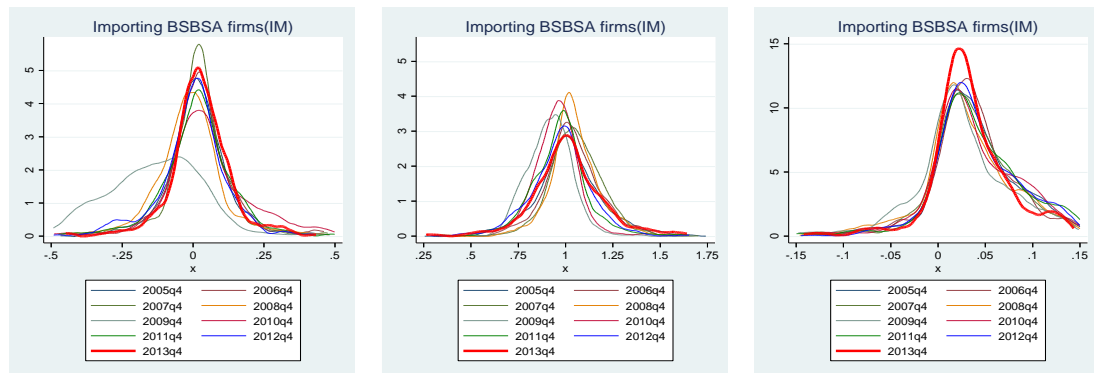
**Figure 3. (continued)**

**3.3 Exporting firms vs importing firms**

**3.3.1 Exporting firms in BSBSA**

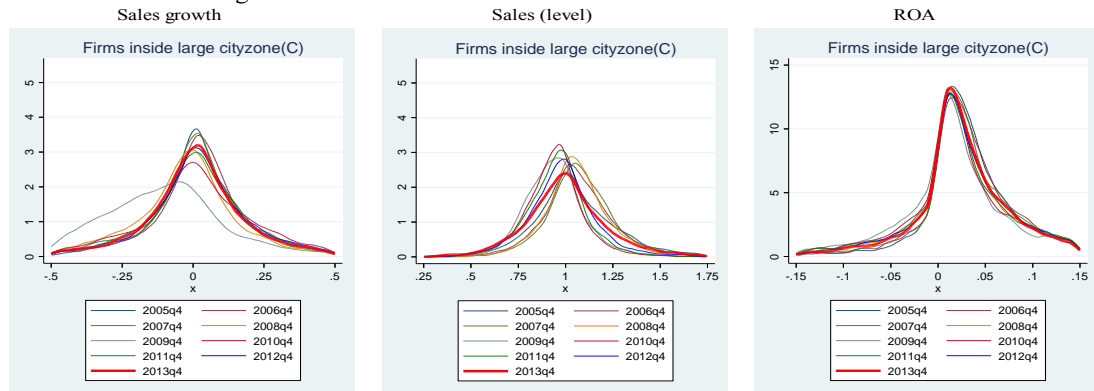


**3.3.2 Importing firms in BSBSA**

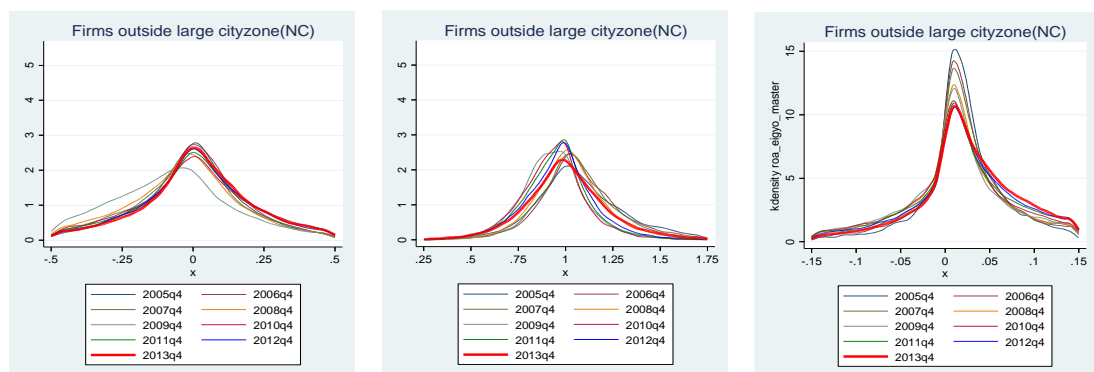


**3.4 Firms inside and outside large cities**

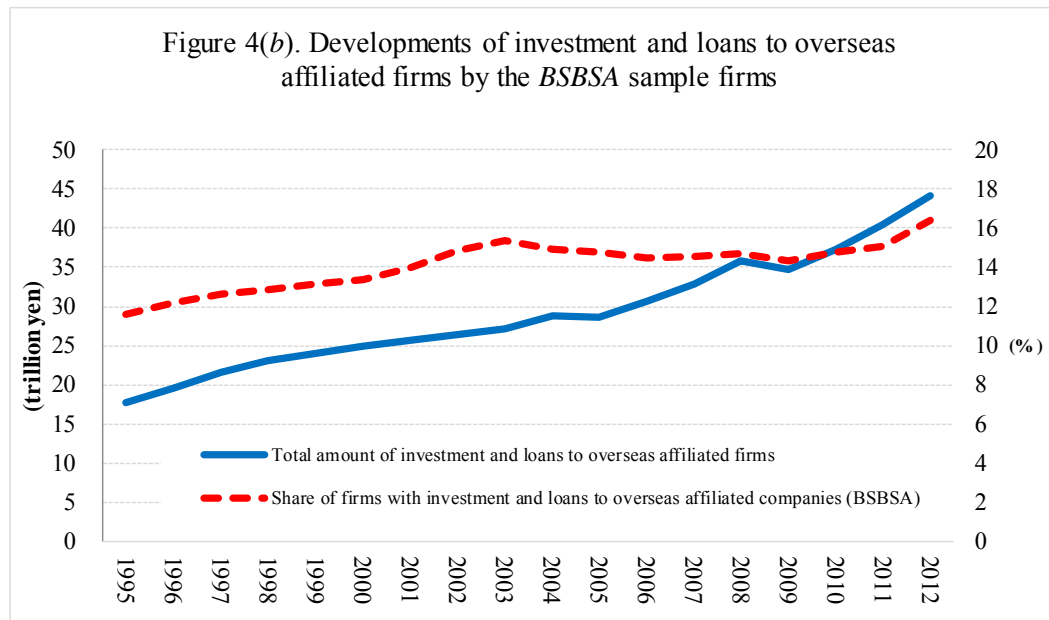
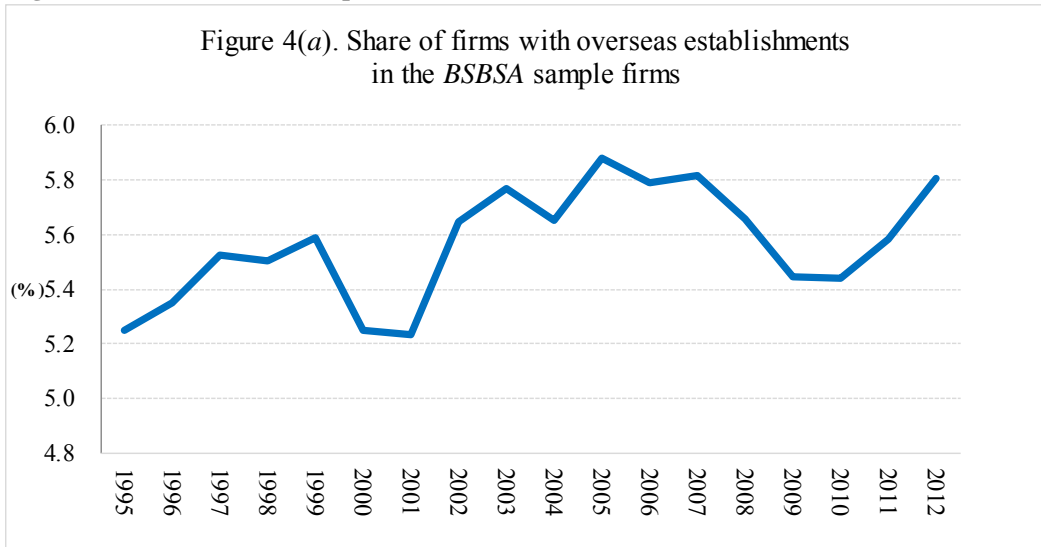
**3.4.1 Firms inside large cities**



**3.4.2 Firms outside large cities**



**Figure 4. Globalization of Japanese firms seen in the BSBSA**



**Table 1-1. Sample statistics (Levels)**

	Total number of observations		Sample of large and medium-sized firms from the <i>Basic Survey of Japanese Business Structure and Activities (BSBSA)</i>				Sample of small firms from <i>Orbis</i> (Bureau Van Dijk Database)			
	BSBSA + <i>Orbis</i>	(Total number of firms)	FY1994-FY2013				FY2005-FY2013			
			Obs.	Mean	Median	S.D.	Obs.	Mean	Median	S.D.
<b>■ Capital (million yen)</b>										
Total Sample	2,249,471 (	359,641 )	525,083	1,524	90	12,836	1,724,388	24	10	294
By firm size:	Large (300 or more employees)	110,186 ( 8,324 )	110,186	6,349	502	27,259				
	Medium (50 to 299 employees)	414,897 ( 37,556 )	414,897	243	76	1,830				
	Small (fewer than 50 employees)	1,724,388 ( 313,761 )	n.a.	n.a.	n.a.	n.a.	1,724,388	24	10	294
By industry:	Manufacturing	390,102 ( 42,720 )	255,194	1,917	90	14,133	134,908	39	12	390
	Wholesale and retail	418,331 ( 54,256 )	182,662	870	90	6,845	235,669	29	10	274
	Construction	1,129,372 ( 204,844 )	8,553	1,132	84	9,371	1,120,819	15	10	34
	Other	311,666 ( 57,821 )	78,674	1,812	96	18,213	232,992	54	10	683
<b>■ Total assets (million yen)</b>										
Total Sample	2,233,526 (	359,641 )	509,139	21,416	3,669	170,717	1,724,387	347	113	1,992
By firm size:	Large (300 or more employees)	107,414 ( 8,324 )	107,414	83,524	19,122	364,577				
	Medium (50 to 299 employees)	401,725 ( 37,556 )	401,725	4,810	2,796	9,524				
	Small (fewer than 50 employees)	1,724,387 ( 313,761 )	n.a.	n.a.	n.a.	n.a.	1,724,387	347	113	1,992
By industry:	Manufacturing	381,789 ( 42,720 )	246,881	22,634	3,421	160,392	134,908	629	350	3,146
	Wholesale and retail	413,037 ( 54,256 )	177,368	16,319	4,474	119,642	235,669	696	320	2,468
	Construction	1,129,102 ( 204,844 )	8,283	13,302	3,983	64,445	1,120,819	204	76	1,090
	Other	309,598 ( 57,821 )	76,607	30,173	2,588	277,583	232,991	517	141	3,385
<b>■ Number of regular employees</b>										
Total Sample	2,202,265 (	359,535 )	508,301	338	127	1,334	1,693,964	12	8	11
By firm size:	Large (300 or more employees)	107,270 ( 8,324 )	107,270	1,139	545	2,756				
	Medium (50 to 299 employees)	401,031 ( 37,556 )	401,031	124	101	72				
	Small (fewer than 50 employees)	1,693,964 ( 313,655 )	n.a.	n.a.	n.a.	n.a.	1,693,964	12	8	11
By industry:	Manufacturing	380,626 ( 42,718 )	246,452	381	128	1,683	134,174	20	18	13
	Wholesale and retail	411,392 ( 54,250 )	177,089	255	120	573	234,303	15	11	12
	Construction	1,118,086 ( 204,794 )	8,263	278	121	654	1,109,823	9	6	9
	Other	292,161 ( 57,773 )	76,497	401	140	1,367	215,664	14	10	13
<b>■ Amount of sales (million yen)</b>										
Total Sample	2,239,123 (	359,641 )	514,745	23,940	4,987	187,502	1,724,378	463	172	1,750
By firm size:	Large (300 or more employees)	108,303 ( 8,324 )	108,303	88,043	24,429	401,316				
	Medium (50 to 299 employees)	406,442 ( 37,556 )	406,442	6,858	3,677	14,945				
	Small (fewer than 50 employees)	1,724,378 ( 313,761 )	n.a.	n.a.	n.a.	n.a.	1,724,378	463	172	1,750
By industry:	Manufacturing	384,783 ( 42,720 )	249,877	21,462	3,817	148,750	134,906	651	399	1,225
	Wholesale and retail	414,733 ( 54,256 )	179,064	30,453	7,972	252,695	235,669	1,263	556	3,814
	Construction	1,129,100 ( 204,844 )	8,285	15,589	4,908	62,362	1,120,815	272	125	924
	Other	310,507 ( 57,821 )	77,519	17,773	3,199	118,532	232,988	465	176	1,460
<b>■ Operating profit (million yen)</b>										
Total Sample	2,232,004 (	359,571 )	507,616	722	93	7,987	1,724,388	8	2	74
By firm size:	Large (300 or more employees)	107,163 ( 8,310 )	107,163	2,811	585	17,122				
	Medium (50 to 299 employees)	400,453 ( 37,500 )	400,453	163	67	964				
	Small (fewer than 50 employees)	1,724,388 ( 313,761 )	n.a.	n.a.	n.a.	n.a.	1,724,388	8	2	74
By industry:	Manufacturing	381,338 ( 42,714 )	246,430	837	90	9,389	134,908	17	5	134
	Wholesale and retail	412,976 ( 54,254 )	177,307	426	96	2,527	235,669	18	4	108
	Construction	1,129,102 ( 204,844 )	8,283	448	97	2,872	1,120,819	3	1	28
	Other	308,588 ( 57,759 )	75,596	1,072	99	11,169	232,992	15	3	119

**Table 1-2-(1). Sample Statistics (Ratio)- from FY1995-FY2013**

	Total number of observations (BSBSA + Orbis)	Sample of large and medium-sized firms from the <i>Basic Survey of Japanese Business Structure and Activities (BSBSA)</i>				Sample of small firms from <i>Orbis</i> (Bureau Van Dijk Database)			
		Obs.	Mean	Median	S.D.	Obs.	Mean	Median	S.D.
<b>■ Sales growth from previous FY (%)</b>									
Total Sample	1,728,948	445,343	-0.1%	0.2%	19.5%	1,283,605	-0.5%	0.0%	38.1%
By firm size:									
Large (300 or more employees)	95,764	95,764	0.8%	1.0%	18.7%				
Medium (50 to 299 employees)	349,579	349,579	-0.4%	0.0%	19.8%				
Small (fewer than 50 employees)	1,283,605	n.a.	n.a.	n.a.	n.a.	1,283,605	-0.5%	0.0%	38.1%
By industry:									
Manufacturing	321,098	219,182	-0.4%	0.1%	20.4%	101,916	-0.7%	-0.1%	30.2%
Wholesale and retail	335,905	154,633	0.1%	0.1%	17.8%	181,272	0.0%	0.2%	27.9%
Construction	844,907	7,041	-1.1%	-0.3%	20.8%	837,866	-1.0%	-0.3%	41.0%
Other	227,038	64,487	0.4%	0.3%	20.2%	162,551	1.6%	0.6%	37.1%
<b>■ ROA (Operating profit/Total assets)</b>									
Total Sample	1,722,892	438,094	3.6%	2.7%	6.7%	1,284,798	1.4%	1.5%	12.4%
By firm size:									
Large (300 or more employees)	94,605	94,605	4.4%	3.3%	6.4%				
Medium (50 to 299 employees)	343,489	343,489	3.4%	2.5%	6.7%				
Small (fewer than 50 employees)	1,284,798	n.a.	n.a.	n.a.	n.a.	1,284,798	1.4%	1.5%	12.4%
By industry:									
Manufacturing	317,564	215,590	3.6%	2.8%	6.6%	101,974	1.7%	1.8%	9.3%
Wholesale and retail	334,143	152,789	2.9%	2.2%	5.7%	181,354	1.9%	1.7%	8.2%
Construction	845,488	7,034	3.2%	2.5%	4.9%	838,454	1.0%	1.3%	13.5%
Other	225,697	62,681	5.6%	4.2%	8.5%	163,016	2.5%	2.1%	12.2%

**Table 1-2-(2). Sample Statistics (Ratio)- from FY2011-FY2013**

	Sample of large and medium-sized firms from the <i>Basic Survey of Japanese Business Structure and Activities</i> (BSBSA)										Sample of small firms from <i>Orbis</i> (Bureau Van Dijk Database)					
	FY2011, FY2012			FY2013			FY2011, FY2012			FY2013						
	Obs.	Mean	Median	S.D.	Obs.	Mean	Median	S.D.	Obs.	Mean	Median	S.D.	Obs.	Mean	Median	S.D.
■ Sales growth from previous FY (%)																
Total Sample	51,607	1.0%	1.0%	17.7%	19,476	2.5%	2.6%	17.3%	398,326	2.1%	1.8%	38.3%	173,419	3.4%	2.5%	35.8%
By firm size:																
Large (300 or more employees)	11,115	0.4%	0.9%	16.8%	4,036	3.5%	3.2%	16.6%								
Medium (50 to 299 employees)	40,492	1.1%	1.0%	17.9%	15,440	2.3%	2.3%	17.4%								
Small (fewer than 50 employees)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	398,326	2.1%	1.8%	38.3%	173,419	3.4%	2.5%	35.8%
By industry:																
Manufacturing	23,357	0.0%	0.2%	19.3%	9,200	1.5%	1.8%	18.4%	29,040	3.1%	2.2%	29.2%	13,307	1.0%	0.8%	28.0%
Wholesale and retail	16,414	1.7%	1.4%	15.3%	6,484	3.6%	3.3%	16.2%	50,741	2.2%	1.6%	27.2%	23,372	2.5%	2.0%	25.8%
Construction	688	3.4%	2.8%	18.0%	415	6.7%	6.6%	18.1%	258,220	1.9%	2.2%	41.7%	109,645	4.0%	3.9%	39.4%
Other	11,148	1.6%	1.4%	17.5%	3,377	2.8%	2.7%	15.7%	60,325	2.6%	1.1%	35.4%	27,095	2.9%	1.0%	31.1%
■ ROA (Operating profit/Total assets)																
Total Sample	51,144	4.2%	3.1%	7.0%	13,950	4.2%	3.2%	5.8%	398,758	1.7%	1.5%	13.2%	173,597	3.2%	2.2%	12.8%
By firm size:																
Large (300 or more employees)	11,016	4.8%	3.6%	6.7%	3,163	4.8%	3.8%	5.4%								
Medium (50 to 299 employees)	40,128	4.0%	3.0%	7.0%	10,787	4.0%	3.0%	5.9%								
Small (fewer than 50 employees)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	398,758	1.7%	1.5%	13.2%	173,597	3.2%	2.2%	12.8%
By industry:																
Manufacturing	23,237	3.5%	2.8%	6.5%	6,237	3.4%	2.8%	5.4%	29,063	1.9%	1.8%	9.5%	13,314	2.6%	2.1%	9.3%
Wholesale and retail	16,382	4.0%	3.0%	6.0%	4,814	3.8%	2.9%	4.9%	50,774	1.9%	1.7%	8.8%	23,385	2.3%	1.8%	8.4%
Construction	686	4.1%	3.1%	5.5%	413	5.2%	4.1%	6.0%	258,419	1.5%	1.3%	14.4%	109,735	3.5%	2.2%	14.1%
Other	10,839	6.0%	4.4%	8.7%	2,486	6.4%	5.0%	7.5%	60,502	2.7%	2.1%	12.3%	27,163	3.2%	2.5%	12.1%

**Table 2. Effects of exchange rate and control variables on the performance of Japanese firms**

	Dep: Sales growth ( $\Delta \ln S_{i,t}$ )		Dep: $\Delta ROA_{i,t}$	
	BSBSA (FY1995-FY2013)	BSBSA (FY1995-FY2013) plus small firms in <i>Orbis</i> (FY2005-FY2013)	BSBSA (FY1995-FY2013)	BSBSA (FY1995-FY2013) plus small firms in <i>Orbis</i> (FY2005-FY2013)
Annual changes in real effective exchange rate ( $G\_REER_t$ )	-0.121 *** -0.017 ***	-0.129 *** 0.037 ***	-0.010 *** 0.013 ***	-0.006 *** 0.022 ***
Trade surplus firm dummy $i \times Trade\ surplus\ ratio\ i \times G\_REER_t$	-0.627 ***	-0.377 ***	-0.152 ***	-0.112 ***
Trade surplus firm dummy $i \times Trade\ surplus\ ratio\ i \times G\_REER_{t-1/2}$	-0.520 ***	-0.840 ***	0.010	-0.017
(1-Trade surplus firm dummy $i$ ) $\times$ Trade surplus ratio $i \times G\_REER_t$	0.396 ***	0.123	-0.192 ***	-0.231 ***
(1-Trade surplus firm dummy $i$ ) $\times$ Trade surplus ratio $i \times G\_REER_{t-1/2}$	0.012	0.347 ***	0.058 ***	0.081 ***
Annual growth of private demand $t-1/2$	0.126 ***	0.291 ***	-0.056 ***	0.040 ***
Annual growth of public demand $t-1/2$	0.252 ***	0.508 ***	0.011 ***	0.032 ***
US and European GDP growth $t$ ( $G\_WEST_t$ )	0.397 ***	0.611 ***	0.051 ***	0.071 ***
$G\_WEST_t \times$ Exporting firm dummy $i$	0.775 ***	0.526 ***	0.075 ***	0.046 ***
Asian GDP growth $t$ ( $G\_ASIA_t$ )	0.453 ***	0.118 ***	0.060 ***	0.018 ***
$G\_ASIA_t \times$ Exporting firm dummy $i$	-0.143 ***	-0.099 ***	-0.008 ***	0.003
Annual changes in oil price ( $G\_OILP_t$ )	0.045 ***	0.031 ***	0.001	-0.001
$G\_OILP_{t-1/2}$	0.014 ***	0.022 ***	-0.004 ***	-0.003 ***
Importing firm dummy $i \times G\_OILP_t$	0.024 ***	0.042 ***	0.004 ***	0.006 ***
Importing firm dummy $i \times G\_OILP_{t-1/2}$	-0.011 ***	-0.021 ***	-0.004 ***	-0.009 ***
Number of observations	445,343	1,728,948	378,151	1,306,343
Pseudo R2	0.032	0.011	0.008	0.002

Notes: Coefficients are from median regressions. Regressions also include 1997 VAT dummy and a constant.

\*\*\* (\*\* / \*) indicates the coefficient is significantly different from zero at the 1 (5 / 10) % level.

**Table 3. Effects of exchange rate and control variables on the performance of Japanese firms by firm size**

	Dep: Sales growth ( $\Delta \ln S_{i,t}$ )				Dep: $\Delta ROA_{i,t}$			
	BSBSA (FY1995-FY2013)		Orbis (FY2005-FY2013)		BSBSA (FY1995-FY2013)		Orbis (FY2005-FY2013)	
	Large firms	Medium-sized firms	Small firms	Small firms	Large firms	Medium-sized firms	Small firms	
Annual changes in real effective exchange rate ( $G\_REER_t$ )	-0.110 ***	-0.122 ***	-0.009 ***	-0.007 ***	-0.021 ***	-0.007 ***	-0.001 ***	
$G\_REER_{t-1/2}$	-0.033 ***	-0.012 ***	0.011 **	0.010 ***	0.022 ***	0.010 ***	0.030 ***	
Trade surplus firm dummy $i \times Trade$ surplus ratio $i \times G\_REER_t$	-0.739 ***	-0.544 ***		-0.187 ***	-0.112 ***			
Trade surplus firm dummy $i \times Trade$ surplus ratio $i \times G\_REER_{t-1/2}$	-0.546 ***	-0.411 ***		-0.010	0.023			
(1-Trade surplus firm dummy $i$ ) $\times$ Trade surplus ratio $i \times G\_REER_t$	0.286 **	0.452 ***		-0.165 ***	-0.213 ***			
(1-Trade surplus firm dummy $i$ ) $\times$ Trade surplus ratio $i \times G\_REER_{t-1/2}$	-0.250 **	0.080		0.029	0.072 ***			
Annual growth of private demand $t-1/2$	0.156 ***	0.131 ***	0.106 ***	-0.075 ***	-0.050 ***	0.051 ***		
Annual growth of public demand $t-1/2$	0.236 ***	0.260 ***	-0.053 **	-0.017 ***	0.018 ***	-0.007		
US and European GDP growth $t$ ( $G\_WEST_t$ )	0.656 ***	0.348 ***	2.391 ***	0.062 ***	0.048 ***	0.179 ***		
$G\_WEST_t \times$ Exporting firm dummy $i$	0.526 ***	0.820 ***	1.680 ***	0.063 ***	0.080 ***	0.174 ***		
Asian GDP growth $t$ ( $G\_ASIA_t$ )	0.520 ***	0.432 ***	-1.338 ***	0.078 ***	0.054 ***	-0.081 ***		
$G\_ASIA_t \times$ Exporting firm dummy $i$	-0.173 ***	-0.141 ***	-0.174 ***	-0.002	-0.009 ***	-0.030 ***		
Annual changes in oil price ( $G\_OILP_t$ )	0.024 ***	0.050 ***	-0.036 ***	0.002	0.001	-0.004 ***		
$G\_OILP_{t-1/2}$	0.015 ***	0.014 ***	-0.014 ***	-0.004 ***	-0.003 ***	-0.003 ***		
Importing firm dummy $i \times G\_OILP_t$	0.036 ***	0.021 ***	0.057 ***	0.005 ***	0.003 ***	0.004 ***		
Importing firm dummy $i \times G\_OILP_{t-1/2}$	-0.008 ***	-0.013 ***	-0.003	-0.006 ***	-0.004 ***	-0.008 ***		
Number of observations	95,764	349,579	1,283,605	83,424	294,727	928,192		
Pseudo R2	0.039	0.030	0.010	0.015	0.007	0.001		

Notes: Coefficients are from median regressions. Regressions also include a 1997 VAT dummy and a constant.

\*\*\* (\*\* / \*) indicates the coefficient is significantly different from zero at the 1 (5 / 10) % level. ††† (†† / †) indicates the coefficient is significantly different from that for large firms at the 1 (5 / 10) % level.



**Table 4. Effects of exchange rate on the performance of Japanese firms by industry**

	BSBSA (FY1995-FY2013): Large firms & medium-sized firms				Orbis (FY2005-FY2013) Small firms			
	Manufacturing	Wholesale & retail	Construction	Others	Manufacturing	Wholesale & retail	Construction	Others
<b>Dep: Sales growth (<math>\Delta \ln S_{it}</math>)</b>								
Annual changes in real effective exchange rate (G_REER <sub>t</sub> )	-0.150 ***	-0.122 ***	-0.186 ***	-0.085 ***	0.095 ***	-0.002	-0.049 ***	-0.018 *
G_REER <sub>t-12</sub>	-0.052 ***	0.033 ***	0.086 **	-0.024 ***	-0.117 ***	-0.098 ***	0.069 ***	-0.023 ***
Trade surplus firm dummy <sub>t</sub> × Trade surplus ratio <sub>t</sub> × G_REER <sub>t</sub>	-0.673 ***	-0.481 ***						
Trade surplus firm dummy <sub>t</sub> × Trade surplus ratio <sub>t</sub> × G_REER <sub>t-12</sub>	-0.264 ***	-0.887 ***						
(1-Trade surplus firm dummy <sub>t</sub> ) × Trade surplus ratio <sub>t</sub> × G_REER <sub>t</sub>	0.391 ***	0.405 ***						
(1-Trade surplus firm dummy <sub>t</sub> ) × Trade surplus ratio <sub>t</sub> × G_REER <sub>t-12</sub>	-0.239 *	0.220 ***						
Annual growth of private demand <sub>t-12</sub>	-0.103 ***	0.209 ***	0.859 ***	0.347 ***	0.069	-0.024	0.151 ***	-0.097 **
Annual growth of public demand <sub>t-12</sub>	0.191 ***	0.252 ***	0.361 ***	0.337 **	0.250 ***	0.225 ***	-0.086 **	-0.374 ***
Number of observations	219,182	154,633	7,041	64,487	101,916	181,272	837,866	162,551
Pseudo R2	0.043	0.030	0.029	0.021	0.032	0.025	0.008	0.005
<b>Dep: <math>\Delta ROA_{it}</math></b>								
Annual changes in real effective exchange rate (G_REER <sub>t</sub> )	-0.023 ***	-0.003 ***	-0.016 **	-0.001 ***	-0.003	0.002	-0.002	-0.010 ***
G_REER <sub>t-12</sub>	0.013 ***	0.011 ***	0.012 *	0.021 ***	0.040 ***	0.010 ***	0.037 ***	0.031 ***
Trade surplus firm dummy <sub>t</sub> × Trade surplus ratio <sub>t</sub> × G_REER <sub>t</sub>	-0.187 ***	-0.072 ***						
Trade surplus firm dummy <sub>t</sub> × Trade surplus ratio <sub>t</sub> × G_REER <sub>t-12</sub>	0.028 *	-0.063 ***						
(1-Trade surplus firm dummy <sub>t</sub> ) × Trade surplus ratio <sub>t</sub> × G_REER <sub>t</sub>	-0.249 ***	-0.175 ***						
(1-Trade surplus firm dummy <sub>t</sub> ) × Trade surplus ratio <sub>t</sub> × G_REER <sub>t-12</sub>	0.078 **	0.054 ***						
Annual growth of private demand <sub>t-12</sub>	-0.147 ***	-0.017 ***	0.004	0.034 ***	0.008	-0.002	0.084 ***	0.006
Annual growth of public demand <sub>t-12</sub>	0.014 ***	0.011 ***	-0.052 ***	0.018 **	0.001	0.010	-0.014 **	-0.016
Number of observations	188,761	131,849	5,934	51,607	76,000	137,679	604,908	109,605
Pseudo R2	0.014	0.008	0.004	0.003	0.006	0.003	0.002	0.001

Notes: Coefficients are from median regressions. Regressions also include the same control variables as in the regressions reported in Tables 2. \*\*\* (\*\* / \*) indicates the coefficient is significantly different from zero at the 1 (5 / 10) % level. ††† (†† / †) indicates the coefficient is significantly different from that for manufacturing firms at the 1 (5 / 10) % level.

**Table 5. Effects of exchange rate on the performance of Japanese firms in 2013. (BSBSA sample only)**

	Dep: Sales growth ( $\Delta \ln Si,t$ )				Dep: $\Delta ROA_{i,t}$			
	All industries	Manufacturing & retail	Construction	Others	All industries	Manufacturing & retail	Construction	Others
<b>5(a) Results based on the sample until the end of FY2013.</b>								
Annual changes in real effective exchange rate (G_REER <sub>t</sub> )	-0.069***	-0.098***	-0.072***	-0.057***	-0.003***	-0.015***	-0.008***	0.006**
G_REER <sub>t/2</sub>	-0.024***	-0.062***	0.027***	-0.023***	0.012***	0.012***	0.008	0.020***
Trade surplus firm dummy <sub>t</sub> × Trade surplus ratio <sub>t</sub> × G_REER <sub>t</sub>	-0.810***	-0.811***	-0.537***		-0.159***	-0.195***		
Trade surplus firm dummy <sub>t</sub> × Trade surplus ratio <sub>t</sub> × G_REER <sub>t/2</sub>	-0.487***	-0.251***	-0.943***		0.010	0.031		
(1-Trade surplus firm dummy <sub>t</sub> ) × Trade surplus ratio <sub>t</sub> × G_REER <sub>t</sub>	0.388***	0.197	0.456***		-0.188***	-0.243***		
(1-Trade surplus firm dummy <sub>t</sub> ) × Trade surplus ratio <sub>t</sub> × G_REER <sub>t/2</sub>	0.038	-0.188	0.233***		0.061***	0.081**		
2013FY Dummy <sub>t</sub> × G_REER <sub>t</sub>	-0.143***	-0.150***	-0.146***	-0.067***	-0.021***	-0.025***	-0.037***	-0.017***
2013FY Dummy <sub>t</sub> × Trade surplus firm dummy <sub>t</sub> × Trade surplus ratio <sub>t</sub> × G_REER <sub>t</sub>	0.594***	0.424***	0.248		0.037	0.071**		
2013FY Dummy <sub>t</sub> × (1-Trade surplus firm dummy <sub>t</sub> ) × Trade surplus ratio <sub>t</sub> × G_REER <sub>t</sub>	0.100	0.435*	-0.136		-0.010	-0.038		
Number of observations	445,343	219,182	154,633	7,041	378,151	188,761	5,934	51,607
Pseudo R2	0.033	0.044	0.031	0.021	0.009	0.015	0.005	0.003
<b>5(b) Results based on the sample excluding the 4th quarter of FY2013.</b>								
Annual changes in real effective exchange rate (G_REER <sub>t</sub> )	-0.068***	-0.096***	-0.070***	-0.056***	-0.003***	-0.015***	-0.008***	0.006**
G_REER <sub>t/2</sub>	-0.016***	-0.063***	0.034***	-0.020**	0.013***	0.012***	0.009	0.020***
Trade surplus firm dummy <sub>t</sub> × Trade surplus ratio <sub>t</sub> × G_REER <sub>t</sub>	-0.809***	-0.807***	-0.541***		-0.159***	-0.195***		
Trade surplus firm dummy <sub>t</sub> × Trade surplus ratio <sub>t</sub> × G_REER <sub>t/2</sub>	-0.483***	-0.253***	-0.902***		0.011	0.032		
(1-Trade surplus firm dummy <sub>t</sub> ) × Trade surplus ratio <sub>t</sub> × G_REER <sub>t</sub>	0.396***	0.187	0.454***		-0.187***	-0.239***		
(1-Trade surplus firm dummy <sub>t</sub> ) × Trade surplus ratio <sub>t</sub> × G_REER <sub>t/2</sub>	0.038	-0.184	0.234***		0.060***	0.078**		
2013FY Dummy <sub>t</sub> × G_REER <sub>t</sub>	-0.055***	-0.068***	-0.038***	-0.031	-0.015***	-0.022***	-0.036***	-0.012**
2013FY Dummy <sub>t</sub> × Trade surplus firm dummy <sub>t</sub> × Trade surplus ratio <sub>t</sub> × G_REER <sub>t</sub>	0.846***	0.596***	0.694*		0.107**	0.165**		
2013FY Dummy <sub>t</sub> × (1-Trade surplus firm dummy <sub>t</sub> ) × Trade surplus ratio <sub>t</sub> × G_REER <sub>t</sub>	0.092	0.510	-0.239		-0.083	-0.055		
Number of observations	433,696	213,929	150,609	6,816	370,596	185,492	5,781	50,199
Pseudo R2	0.032	0.0436	0.0287	0.020	0.009	0.015	0.004	0.003

Notes: Coefficients are from median regressions. Regressions also include the same control variables as in the regressions reported in Tables 2.

\*\*\* (\*\* / \*) indicates the coefficient is significantly different from zero at the 1 (5 / 10) % level.

††† (†† / †) indicates the coefficient is significantly different from that for manufacturing firm at the 1 (5 / 10) % level.

**Table 6. Firms' global activities and the effects of exchange rate changes (BSBSA sample only)**

	Dep: Sales growth ( $\Delta \ln S_{i,t}$ )		Dep: $\Delta ROA_{i,t}$	
	All industries	Wholesale & retail	All industries	Wholesale & retail
<b>6(a) Is the positive effects of yen depreciation larger for firms with overseas business establishments?</b>				
Annual changes in real effective exchange rate ( $G\_REER_t$ )	-0.115 ***	-0.118 *** <sup>†</sup>	-0.009 ***	-0.002 **
$G\_REER_{t-1/2}$	-0.011 ***	0.040 ***	0.013 ***	0.012 ***
Trade surplus firm dummy $i \times Trade\ surplus\ ratio\ i \times G\_REER_t$	-0.518 ***	-0.473 ***	-0.134 ***	-0.048 **
Trade surplus firm dummy $i \times Trade\ surplus\ ratio\ i \times G\_REER_{t-1/2}$	-0.558 ***	-0.748 ***	-0.019	-0.043 *
$(1 - Trade\ surplus\ firm\ dummy\ i) \times Trade\ surplus\ ratio\ i \times G\_REER_t$	0.378 ***	0.419 ***	-0.192 ***	-0.178 ***
$(1 - Trade\ surplus\ firm\ dummy\ i) \times Trade\ surplus\ ratio\ i \times G\_REER_{t-1/2}$	0.009	0.202 ***	0.063 ***	0.042 ***
Overshas business establishments dummy $i \times G\_REER_t$	-0.042 ***	-0.034 **	-0.003	-0.004
Overshas business establishments dummy $i \times G\_REER_{t-1/2}$	-0.024 **	-0.066 *** <sup>†</sup>	-0.001	-0.014 ***
Overshas business establishments dummy $i$	-0.002 ***	-0.006 ***	-0.000	-0.001 **
Number of observations	414,146	145,618	349,766	123,614
Pseudo R2	0.030	0.029	0.008	0.008
<b>6(b) Does the acceleration of overseas transfer lead to the smaller gains through the export channel in 2013?</b>				
2013FY Dummy $i \times G\_REER_t$	-0.145 ***	-0.147 ***	-0.022 ***	-0.014 ***
2013FY Dummy $i \times Trade\ surplus\ firm\ dummy\ i \times Trade\ surplus\ ratio\ i \times G\_REER_t$	0.719 ***	0.608 ***	0.006	-0.122 **
2013FY Dummy $i \times (1 - Trade\ surplus\ firm\ dummy\ i) \times Trade\ surplus\ ratio\ i \times G\_REER_t$	-0.048	0.244	0.017	0.003
Overshas transfer enhancement dummy $i \times 2013FY\ Dummy\ i \times G\_REER_t$	0.007	-0.009	0.002	0.000
Overshas transfer enhancement dummy $i \times 2013FY\ Dummy\ i \times Trade\ surplus\ firm\ dummy\ i \times Trade\ surplus\ ratio\ i \times G\_REER_t$	-0.438	-0.303	0.027	0.063
Number of observations	359,621	171,265	303,332	109,686
Pseudo R2	0.031	0.041	0.008	0.014

Notes: Coefficients are from median regressions. Regressions in Table 6(a) include the same controlling variables as those reported in Table 2.

Regressions in Table 6(b) also include the same explanatory variables as those included in Table 6(a).

\*\*\* (\*\* / \*) indicates the coefficient is significantly different from zero at the 1 (5 / 10) % level. ††† (†† / †) indicates the coefficient is significantly different from that of manufacturing firm at the 1 (5 / 10) % level.

**Appendix. Definitions of variables and their data sources.**

Variable	Abbreviation	Definition	Source
Capital		Amount of firm <i>i</i> 's capital.	BSBSA, Orbis
Total assets		Amount of firm <i>i</i> 's total assets including fixed assets and current assets.	BSBSA, Orbis
Number of regular employees		Firm <i>i</i> 's employees except part-time workers.	BSBSA, Orbis
Sales	$S_{i,t}$	Amount of firm <i>i</i> 's total sales	BSBSA, Orbis
Operating profit		Operating profit = Sales - Operating cost	BSBSA, Orbis
ROA		Operating profit / Total assets (end of the preceeding year)	Author
Export value of firm <i>i</i> in period <i>t</i>	$X_{i,t}$	Amount of firm <i>i</i> 's sales (exports) to abroad	BSBSA
Exporting firm dummy	$XDum_i$	Dummy variable that takes 1 if firm <i>i</i> exports	BSBSA, Author
Import value of firm <i>i</i> in period <i>t</i>	$M_{i,t}$	Amount of firm <i>i</i> 's purchase (imports) from abroad	BSBSA
Importing firm dummy	$MDum_i$	Dummy variable that takes 1 if firm <i>i</i> imports	BSBSA, Author
Trade surplus ratio	$(X_i - M_i) / S_i$	The (average) share of firm <i>i</i> 's net exports in its total sales	BSBSA, Author
Trade surplus firm dummy	$TSDum_i$	Dummy variable that takes 1 if firm <i>i</i> 's export is larger than its import on average.	BSBSA, Author
FY2013 dummy	$D2013_t$	Dummy variable that takes 1 if period <i>t</i> belongs to fiscal year 2013.	BSBSA, Author
Overseas business establishments dummy		Dummy variable that takes 1 if firm <i>i</i> have at least one overseas business establishment.	BSBSA, Author
Overseas transfer enhansment dummy		Dummy variable that takes 1 if firm <i>i</i> increase investment and loans for overseas affiliated companies by more than 50%, from average 2005-2010 to average 2011-2012.	BSBSA, Author
Real effective exchange rate	$EER_t$	Real effective exchange rate; $G\_REER_t = \ln EER_t - \ln EER_{t-12}$	BOJ, Author
Real domestic private demand	$DR_t$	Real domestic private demand including private consumption, private residential and non-residential investment, and change in private inventories.	SNA, Author
Real domestic public demand	$DU_t$	Real domestic private demand including government consumption, public investment and change in public inventories.	SNA, Author
Real GDP of the advanced western countries	$DW_t$	Share-weighted real GDP of U.S., Canada, UK, Switzerland, Denmark, Sweden, Norway, Iceland, Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain; $G\_WEST_t = \ln DW_t - \ln DW_{t-12}$ .	IFS, Author
Real GDP of Asian economies	$DE_t$	Real GDP Asian countries excluding Japan; $G\_ASIA_t = \ln DE_t - \ln DE_{t-12}$ .	IFS, Author
Oil price	$POIL_t$	Index of average crude price of Dubai Fateh, U.K. Brent and West Texas Intermediate (spot, US \$ / barrel); $G\_OILP_t = \ln POIL_t - \ln POIL_{t-12}$	IFS, Author

(Note)

1. Macroeconomic variables are 12-month backward moving averages. If the monthly data is not available, we calculate monthly-splitted series from quarterly data by using frequency conversion method (quadratic-match average) in Eviews 8.

2. Firms which do not meet following criteria are removed from sample in order to exclude outliers.

- Obs.  $\geq 3$
- Sales data is available.
- Total employees  $> 0$
- Total assets  $> 0$
- Capital  $\geq 3$  million yen
- ROA  $\leq 3\sigma$