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Why Do Exporters and Multinational Firms Pay Higher Wages?:

Evidence from Japanese Linked Employer–Employee Data

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Why do Exporters and Multinational Firms pay higher Wages? Evidence from Japanese Linked Employer–Employee Data

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Abstract

This study investigates the reasons why exporters, multinational enterprises (MNEs), and foreign-owned firms pay higher wages, using Japanese linked employer–employee data. It jointly examines the premiums for exporters, domestically owned MNEs, and foreign-owned firms and shows that observable plant and worker characteristics as well as region and industry fixed effects can account for almost all wage premiums of local exporters and domestically owned MNEs, whereas they cannot fully account for the wage premium for foreign firms. The results from quantile regressions reveal that the residual foreign wage premium is larger in the higher quantiles of the wage distribution.

Keywords: wage premium, quantile regression, exporter, multinational enterprises, foreign-owned firms

JEL Classification: F14, F16, J31

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1 Introduction

Many previous empirical studies confirm the stylized fact that firms that engage in international markets tend to pay higher wages to their employees. Using linked employer-employee data, recent studies investigate whether the wage premiums for internationalized firms still exist after controlling for both firm and worker characteristics (Frıas et al. 2009; Munch and Skaksen 2008; Schank et al. 2007; Schank et al. 2010; and Verhoogen 2008).

The reasons for the wage premiums have been theoretically explored. Based on the standard firm heterogeneity model of exports and foreign direct investment (FDI), recent theoretical studies consider that exporters and multinational firms pay higher wages than purely domestic firms because of intra-firm rent sharing (Helpman et al. 2010; Amiti and Davis 2012; Egger and Kreickemeier 2009; Egger and Kreickemeier 2013). These studies predict that exporters and multinational firms that obtain additional sales from foreign markets pay higher wages than purely domestic firms in an imperfect labor market.

However, little is know about (i) whether exporters' wage premiums is more important than multinational firms' wage premiums and (ii) whether multinational status is more important than nationality as the source of the wage premiums. This study explores these issues, using new Japanese linked employer-employee data. To the best of my knowledge, most previous studies cannot answer these kind of questions since they have examined wage premiums separately for exporters, domestically owned MNEs, and foreign-owned firms. In contrast, this paper attempts to jointly examine the wage premiums for exporters, domestically owned MNEs, and foreign-owned firms. By so doing, the analysis in this study enables us to disentangle the theoretically predicted reasons for the wage premiums.

To do this, I construct the first set of Japanese-linked employer–employee data from three official surveys. Then, I estimate the Mincer wage equation to reveal the wage premiums. After examining the average relationship between the wage premiums and firm types using OLS, I examine the relationship in each quantile of wage distribution using the quantile regressions (QRs) technique.

OLS analysis reveals that observable plant and worker characteristics as well as region and industry fixed effects can account for almost all wage premiums of local exporters and domestically owned MNEs, whereas they cannot fully account for the wage premium for foreign firms. It means that the international rent sharing mechanism supposed by theoretical studies such as Helpman et al. 2010 and Egger and Kreickemeier (2013) does not work well for Japanese exporters and MNEs.

This finding also suggests that the nationality of the ownership matters for wage premiums, rather than the multinational status or exporting status. In other words, foreign-owned firms may pay

higher wages to their employees for foreign firm-specific reasons. Previous studies suggest that the possible reasons for the foreign wage premiums are compensation for different working conditions in foreign firms (Bernard and Sjoholm 2003; Fabbri et al. 2003; Lipsey and Sjöholm 2004) or for learning opportunities in foreign firms (Görg et al. 2007).

In addition,QR analysis provides evidence that foreign residual wage premiums are higher for workers in higher quantiles of wage distribution. In contrast, negative residual wage premiums for higher quantiles of wage distribution and positive residual wage premiums for lower quantiles are found for local exporters and domestically owned MNEs, although the magnitude of these premiums is small.

The remainder of this paper is organized as follows: In Section 2, I review the literature and discuss the possible reason for the wage premiums for firms that engage in the international market. In Section 3, I explain the methodology. Section 4 provides a description of the data used in this study, together with descriptive statistics of wages by firm type. In Section 5, I present the results. Finally, in Section 6, I present the conclusion.

2 Background

2.1 The possible reasons for the wage premiums

There are at least four reasons for higher average wages in exporting firms and multinational firms. First, exporting firms and multinational firms might pay higher wage because they belong to higher-wage industries. Similarly, second, they might pay higher wage because they locate in higher-wage regions. These two reasons are not directly related to their exporting status and multinational status.

Third, higher average wage in exporting firms and multinational firms can be caused by higher skill composition of their workforce. It is the well-known fact that exporting and multinational activities required for higher skilled workers. This composition effect implies that the wage premiums for exporting firms and multinational firms will vanish after controlling for workers' skill level.

Forth, exporting firms and multinational firms might pay higher wage to an identical worker due to the rent sharing. Helpman et al. (2010), Amiti and Davis (2012), and Egger and Kreickemeier (2009) among others predict that exporters pay higher wages than non-exporters because of the additional sales due to exports. Based on the standard firm heterogeneity model, Egger and Kreickemeier (2013) also provide a theoretical reason for the wage premium for multinational firms. In their model, MNEs are assumed to share the sales from both local and foreign sources with their workers. Such rent

sharing is the reason for the multinational wage premium.

In addition to the above four reasons, previous studies discuss the possibility that foreign ownership generates higher average wage for several reasons. They suggest that foreign wage premiums can be explained by a higher labor demand volatility (Fabbri et al., 2003), a higher foreign closure rate (Bernard and Sjoholm, 2003), or learning opportunities in foreign firms (Görg et al., 2007). Görg et al. (2007) and Malchow-Møller et al. (2013) present theoretical models to explain the wage premium for foreign multinational firms. In the Görg et al. (2007) model, foreign firm-specific on the job training (OJT) is assumed to be the reason for the wage premium for foreign firms.

2.2 Previous empirical evidences

Next, I briefly explain the previous empirical evidences on both exporting firms' and multinational firms' wage premiums. First, wage premium for exporters is empirically confirmed by many previous studies. Whereas previous studies such as Bernard and Jensen (1997) and Bernard and Jensen (1999) employ plant- or firm-level data, more recent studies employ linked employer–employee data to control for both firm and worker characteristics (Frıas et al. 2009, Munch and Skaksen 2008, Schank et al. 2007, Schank et al. 2010, and Verhoogen 2008).

Second, the multinational or foreign wage premium is also confirmed by many previous empirical studies. Firm-level studies reveal that MNEs tend to pay higher wage than non-MNEs (e.g.,Bernard et al. 2009 for the United States, Mayer and Ottaviano 2008 for European countries; Wakasugi et al. 2008 for Japan) and that international rent sharing occurs within MNEs (Budd et al. 2005, Damijan and Marcolin 2013, Martins and Yang 2015). Studies using firm-level data or linked employer–employee data (Lipsey and Sjöholm 2004, Girma and Görg 2007, Heyman et al. 2007, Martins 2011, Hijzen et al. 2013) confirm the existence of foreign wage premiums.

Despite the plenty of the previous studies, we do not know whether exporting firms' wage premiums are more important than multinational firms' wage premium or vice versa. This study, therefore, simultaneously examines both wage premiums for exporters and multinational wage premiums because the data used in this study contain information on both the export status and multinational status. While previous studies using linked employer and employee data focus on only one of the wage premiums for exporters and multinational firms, this study jointly examines both premiums using the extensive linked employer–employee data.

In addition, we do not know whether the nationality of the firm owner or multinational status is important as a reason for the multinational wage premium. To explore this issue, this study clearly

distinguishes domestic multinational firms from foreign multinational firms because the data contain information on foreign ownership and the number of foreign subsidiaries.[1] Therefore, this study estimates wage premiums for both domestic multinational firms and foreign multinational firms. Such an estimate enables us to understand whether the nationality of the owner or multinational status is important for wage premiums.

3 Estimation method

This study employs both OLS and QRs to estimate the Mincer wage equations. After investigating the wage premium using OLS, I conduct QRs to examine wage premiums on a particular percentile of the distribution because these premiums may vary across the range of wages. For example, using QRs, I examine whether high-wage workers obtain higher multinational wage premiums than low-wage workers. QR has several attractive features, as explained in Koenker and Hallock (2001) and Cameron and Trivedi (2010). First, QR enables us to investigate the effects of a covariate on the full distribution or any particular percentile of the distribution, whereas OLS reveals the average relationship between the wage and explanatory variables. Second, QR is robust to the presence of outliers, whereas OLS regression is sensitive to such presence.

First, this study employs OLS and examines whether multinational firms or exporters pay higher wages than non-multinational firms or non-exporters using the following Mincer wage equation:

$$\begin{aligned} \ln WAGE_{ip} \quad &= \beta_0 + \beta_1 EXPORT_p + \beta_2 JMNE_p + \beta_3 FOR_p \\ &+ \beta_4 D_i^{educ} + \beta_5 EXP_i + \beta_6 EXP_i^2 + \beta_7 REGULAR_i \\ &+ \beta_8 TENURED_i + \beta_9 WHITE\_BLUE_i \\ &+ \beta_{10} FIRMSIZE_p + \beta_{11} HEADQUATER_p \\ &+ INDUSTRY_p + REGION_p + \epsilon_{ip} \end{aligned} \tag{1}$$

where $\ln WAGE_{ip}$ is the log of hourly wage for worker i in plant p, $EXPORT_p$ is a dummy variable for local exporters, $JMNE_p$ is a dummy variable for Japanese MNEs, and FOR_p is a dummy variable for foreign ownership status. A vector of education dummies, D_i^{educ}, identifies a worker's education level: junior-high school, high school, junior college, and Bachelor of Arts degree. Potential work

[1] Heyman et al. (2007) also distinguish domestically owned MNEs from foreign-owned firms. Although they define a domestically owned MNE as a firm that reports positive exports to other firms within MNEs, this study defines a domestically owned MNE as a firm that has a foreign subsidiary. The definition of this paper is preferable because it is consistent with standard firm heterogeneity models such as Helpman et al. (2004) and Egger and Kreickemeier (2013).

experience, EXP_i, is defined as age minus the number of years of education, and EXP_i^2 is its square. To control for type of employment and type of workers, I include a dummy variable for regular workers, $REGULAR_i$, a dummy variable for tenured workers, $TENURED_i$, and a dummy variable for white-collar workers, $WHITE\_BLUE_i$. A vector of firm size dummies, $FIRMSIZE_p$, and a vector of plant type (single plant, headquarter, and subsidiary) dummies, $HEADQUATER_p$, are also included to control for plant and firm characteristics. The descriptive statistics of all variables are presented in Table 6 of the Appendix.

Second, this study employs QRs to estimate the wage premium on any particular percentile of the wage distribution. Using the linear programming method, I obtain the qth estimator $\hat{\gamma}_q$, which minimizes over γ_q the objective function:

$$Q(\gamma_q) = \sum_{i:y_i \geq \mathbf{x}_i'\gamma}^{N} q|y_i - \mathbf{x}_i'\gamma_q| + \sum_{i:y_i < \mathbf{x}_i'\gamma}^{N} (1-q)|y_i - \mathbf{x}_i'\gamma_q| \tag{2}$$

where $0 < q < 1$, y_i is the log of hourly wage and $\mathbf{x}_i$ is a vector of explanatory variables. I use the same explanatory variables as those in the case of OLS.

4 Data and overview

4.1 Data

To investigate wage premiums for exporters and MNEs, this study employs the first set of Japanese-linked employer–employee data. Using Japanese data has several advantages. First, Japan is the world's third largest economy, following the United States and China. In Asia, Japan is regard as the representative free economy. Second, many exporters and MNEs operate in Japan. Previous studies use linked employer–employee data for the United States and small European countries, such as Denmark and Sweden. This study adds the case of Japan, which has a large representative free economy in Asia.

To construct the matched employer–employee data, this study uses confidential data from three official surveys: (i) *The Basic Survey on Wage Structure* (2012), (ii) *The Economic Census for Business Frame* (2009), and (iii) *The Economic Census for Business Activity* (2012).[2] We merge the data from these three surveys at the plant level using the common plant-level census ID.

First, I obtain the data on most variables used in the analysis, such as worker-level wage and other

[2]All three surveys are conducted as Fundamental Statistics according to the Statistics Act.

worker-, plant-, and firm-level variables from *the Basic Survey on Wage Structure*, and construct the worker-level cross-sectional data. *The Basic Survey on Wage Structure* is conducted every year from July 1 to July 31 by the Ministry of Health, Labour and Welfare (MHLW).[3] The survey covers plants with five or more regular employees in major industries in Japan. Plants are selected using a uniform sampling method. Employees are also selected using a uniform sampling method from among the plants selected for the survey.

Second, I merge the worker-level data with the firm-level data on FDI and foreign ownership from *The Economic Census for Business Frame*. *The Economic Census for Business Frame* is a newly created census to identify the basic structure of establishments and enterprises in Japan and is conducted by the Ministry of Internal Affairs and Communications (MIC).[4] The 2009 census was the first one and was conducted as of July 1, 2009.

Third, I also merge the worker-level data with the data on the export status from *the Economic Census for Business Activity*. *The Economic Census for Business Activity* is another newly created census to investigate the economic activity of establishments and enterprises in all industries. The purpose of the census is to obtain basic information for conducting various statistical surveys.[5] Using the results of *the 2009 Economic Census for Business Frame*, *the 2012 Economic Census for Business Activity* was conducted by MIC and the Ministry of Economy, Trade and Industry (METI) in February 2012 to investigate the activities of establishments and enterprises during 2011.

After constructing the linked employer–employee data through these steps, I develop a dataset to estimate the Mincer wage equation. The procedure of this study follows that of Kawaguchi (2011). In particular, I restrict my analysis to the sample of full-time male workers under the age of 60 years who work at private firms. The reason for this restriction is as follows: [6] First, I restrict my analysis to full-time workers because information on the education level of part-time workers is unavailable in the survey. Second, I cannot control for the decision of female workers to participate in the labor market given data limitations. Therefore, I restrict my analysis to male workers. Third, I drop the data on workers over 60 years of age to address the fact that workers in Japan at the age of 60 years tend to face large declines in wages.

Following Kawaguchi (2011), the monthly total wage is calculated as the sum of monthly wages plus one-twelfth of yearly bonuses. Then, the hourly wage is calculated as the monthly total wage divided by hours worked, which is used in my analysis.

[3] See the MHLW website (`http://www.mhlw.go.jp/english/database/db-l/wage-structure.html`) for more details.
[4] See the MIC website (`http://www.stat.go.jp/english/data/e-census/index.htm`) for more details.
[5] See the MIC website (`http://www.stat.go.jp/english/data/e-census/2012/index.htm`) for more details.
[6] See Kawaguchi (2011) for more details.

4.2 Overview

Utilizing the data from the two *Economic Censuses*, I classify firms into four types: local firms, local exporters ($EXPORTER$), domestic MNEs ($JMNE$), and foreign-owned firms (FOR). Local firms are domestically owned non-exporters without foreign subsidiaries, whereas local exporters are domestically owned exporters without foreign subsidiaries. Domestic MNEs are domestically owned firms with foreign subsidiaries. Finally, foreign-owned firms are defined as firms for which more than 50% of the equity is foreign owned.

Table 1 presents the number of firms, plants, and workers in the sample by firm type. Among 5,925 firms in the sample, 5,185 firms (87%) are local. The number of domestic MNEs is 418 (7.1%), which is the second largest group. The third largest group is local exporters, at 283 (4.8%). The number of foreign-owned firms is 40 (0.6%). The number of plants by firm type indicates a similar tendency.

In terms of the number of workers, local firms still account for the largest fraction. The number of workers in local firms is 67,957, which is more than 75% of the 89,590 total workers. The number of workers in domestic MNEs is 14,468 (16.1%), and the second largest, which is followed by the number of workers in local exporters, is 5,286 (5.9%). The number of workers in foreign-owned firms is 1,879 (2.1%).

<TABLE 1>

Table 2 provides worker-level descriptive statistics of hourly wage by firm type and indicates that foreign-owned firms tend to pay the highest wages, followed by—in descending order of wage—domestic MNEs, local exporters, and local firms. Figure 1 presents boxplots for a comparison of the distribution of hourly wage by firm type, which indicates an ordering of wages similar to that of Table 2. The hourly wage of foreign-owned firms is distributed over the highest range. The hourly wage of domestic MNEs is distributed over a lower range than that of foreign-owned firms. The hourly wage of local exporters is distributed over a lower range than that of domestic MNEs but a higher range than that of local firms. This wage ordering is consistent with the productivity ordering in the standard firm heterogeneity model of exports and FDI since Helpman et al. (2004) predict that exporters are more productive than non-exporters and MNEs are more productive than exporters.

<TABLE 2>

<FIGURE 1>

Figure 1: Comparison of hourly wage by firm type

5 Estimation results

5.1 OLS

This subsection presents the estimation results using OLS. First, Table 3 presents the estimation results of the Mincer wage equation without worker-level explanatory variables. Column (1) of Table 3 indicates the result of the regression using only three key explanatory variables: $EXPORTER$, $JMNE$, and FOR. The coefficient of $EXPORTER$ is positively significant, implying that local exporters, on average, pay a 17.7% (= exp(0.163)) higher wage than local non-exporters. The coefficients of $JMNE$ and FOR are also positively significant, implying that domestically owned MNEs and foreign-owned firms, on average, pay a 59.2% and 74.2% higher wage than local non-exporters, respectively.

These wage premiums become smaller when including industry and regional fixed effects into the regression, as shown in columns (2)–(4). Industry fixed effects are at the two-digit industry level, whereas regional fixed effects are at the 47-prefecture level. When controlling for both industry and regional fixed effects, the wage premium of local exporters, that of Japanese MNEs, and that of foreign-owned firms are reduced by 31.9%, 31.8%, and 17.3%, respectively. This result suggests that exporters and MNEs belong to the high-wage industry and locate in a high-wage region but that industry and regional factors account for only approximately 17–32% of total wage premiums.

It is noteworthy that the ordering of wage premiums again corresponds to the productivity ordering as predicted by Helpman et al. (2004). Table 3 shows that wage premium for exporters are larger than that for non-exporting local firms but are smaller than that for MNEs.

<TABLE 3>

<TABLE 4>

Table 4 presents the estimation results of the Mincer wage equation using both plant- and worker-level explanatory variables as in equation (1). Columns (1) and (2) provide the baseline results. Column (1) presents the results of the regression using plant-level explanatory variables such as firm size dummies and plant type dummies. These dummies significantly decreased the wage premiums and account for 46.0% of the wage premium for exporters, 51.0% of the wage premium for domestically owned MNEs, and 27.0% of the wage premium for foreign-owned firms. When worker-level explanatory variables such as education dummies are included, the wage premiums are further reduced. The worker-level explanatory variables account for 19.6% of the wage premium for exporters, 16.6% of the wage premium for domestically owned MNEs, and 20.5% of the wage premium for foreign-owned firms. As a result, the wage premiums for both exporters and Japanese MNEs diminish, whereas the wage premium for foreign firms becomes smaller but still exists. The residual wage premium for foreign firms, 21.5% (= exp(0.195)), can be regarded as a pure foreign wage premium.

To eliminate the effects of exports revenue on wages, in columns (3) and (4), the sample is restricted to workers who work at non-exporting firms. The results are qualitatively similar to those of columns (1) and (2), although wage premiums for foreign firms and domestically owned MNEs become slightly smaller, implying that the residual foreign wage premium cannot be explained by exports revenue.

As a robustness check, the number of foreign subsidiaries, N_MNE, is used instead of a dummy variable for domestically owned MNEs, $JMNE$, in columns (5) and (6). The results for the wage premium for foreign-owned firms are qualitatively and quantitatively similar to the baseline results. However, the wage premium for domestically owned MNEs becomes positively significant, although the magnitude of the premium is small. Column (6) indicates that a 1% increase in the number of foreign subsidiaries is associated with a 1.4% increase in the hourly wage.

5.2 Decomposition of wage premiums

Based on the estimation results of Tables 3 and 4, Figure 2 shows the extent to which region, industry, plant, and worker factors can explain the wage premiums for local exporters, Japanese multinational firms, and foreign-owned firms. The most important factor for the wage premiums is plant characteristics such as firm size. The evidence here is consistent with the well-known fact that larger firms tend to pay higher wages. For Japanese multinational firms and local exporters, plant factor can explain about half of the wage premiums. Plant factor accounts for approximately 30% of the wage premiums for foreign-owned firms.

For Japanese multinational firms and local exporters, the region and industry fixed effects explain more than 30% of the wage premiums. It means that Japanese multinational firms and local exporters locate in high-wage regions and belong to high-wage industries. However, there is a difference between Japanese multinational firms and local exporters. The results show that for Japanese multinational firms, region fixed effect is much more important than industry fixed effect, while for local exporters, it is vice versa. For foreign-owned firms, the region and industry fixed effects are also important and explain more than 20% of the wage premium.

Worker characteristics such as experience and education also play an important role and account for approximately 13–20% of the wage premiums. For foreign-owned firms and local exporters, they explain about 20% of the wage premiums. For Japanese multinational firms, they explain 13.6% of the wage premiums. The results indicate that firms that engage in international market tend to employ more skilled workers than do purely domestic firms.

As shown in Figure 2, most of the wage premiums can be explained by observable plant and worker characteristics as well as region and industry fixed effects. These observable factors account for all most all wage premiums for Japanese multinational firms and local exporters and more than 70% of the wage premium for foreign-owned firms. In other words, the wage premiums for Japanese multinational firms and local exporters virtually disappear, whereas that for foreign-owned firms still exist, after controlling for the observable factors.

<FIGURE 2>

Figure 2: Decomposition of wage premiums in Japanese manufacturing, 2012

Figure 2 also indicates that while the unexplained wage premiums for local exporters and Japanese multinational firms are close to zero, that for foreign-owned firms is large enough. The result implies that, on average, foreign-owned firms tend to pay 29% higher in wages to an identical worker than do purely domestic firms with similar characteristics in the same industry and in the same region.

In summary, the results in this subsection reveal that the residual foreign wage premium exists but the wage premiums for exporters and domestically owned MNEs virtually diminish after controlling for worker- and plant-level observable factors. The residual foreign wage premium is quantitatively large. In other words, foreign firms tend to pay higher wages than local firms for foreign firm-specific reasons. The wage premium for exporters and domestically owned MNEs can be almost fully explained by observable plant and worker characteristics, such as firm size and education level. This indicates that nationality of the ownership matters for the wage premiums rather than multinational status or exporting status.

5.3 QRs

This subsection presents the estimation results from QRs. While the results from OLS provide information on the average relationship between wage and firm type, the results from QRs provide information on the relationship between wage and firm type at different quantiles of the distribution of the log of hourly wage. The estimated coefficients for the dummies, $EXPORTER$, $JMNE$, and FOR, can be interpreted as the deviation from the respective quantile of $\ln WAGE$ for local exporters, domestically owned MNEs, or foreign firms.

<TABLE 5>

Table 5 presents the estimation results of equation (2). First, the results show that wage premiums for foreign-owned firms are positively significant in all quantiles but the lowest one. This finding is consistent with those in the previous subsection. In addition, the results indicate that the wage premium for foreign firms is larger in the higher quantile of the distribution.[7] This finding suggests that foreign firms pay higher premiums for higher-wage workers.

Second, Table 5 shows that wage premiums for exporters and domestically owned MNEs are significantly positive for workers in lower quantiles but significantly negative for workers in higher

[7] Table 8 provides the test for the equality of the coefficients between quantiles.

quantiles, although the magnitude is relatively small. This finding implies that local exporters and domestically owned MNEs pay positive wage premiums for lower-wage workers but negative wage premiums for higher-wage workers, whereas the previous subsection reveals that they, on average, pay negligible wage premiums. This finding strikingly contrasts with the finding for the foreign wage premium, although its reason is beyond the scope of this study. Possible reasons for the surprisingly negative wage premiums for exporters and domestically owned MNEs are large payoff at the time of retirement and retirement pension in typical Japanese firms that adopt so-called life-time employment system.

Third, Table 5 indicates that wage premiums for foreign firms are significantly larger than those for exporters and Japanese MNEs in all quantiles, except the lowest one.[8] This finding is in line with those in the previous subsection that indicate that foreign wage premiums are relatively large, whereas wage premiums for exporters and domestically owned MNEs are negligible.

In summary, this subsection reveals that the wage premiums for exporters, domestic MNEs, and foreign firms substantially vary across the quantiles of wage distribution. In particular, foreign wage premiums are larger in the higher quantiles of wage distribution. In contrast, wage premiums for exporters and domestically owned MNEs are positive for the lower quantiles of wage distribution but negative for the higher quantiles.

6 Concluding remarks

This paper is the first attempt to jointly examine the wage premiums for exporters, domestically owned MNEs, and foreign-owned firms using Japanese-linked employer–employee data. The OLS estimation results of the Mincer wage equation indicate that the foreign wage premium is far more important than wage premiums for exporters and domestically owned MNEs. In particular, exporters and domestically owned MNEs pay higher average wages than purely domestic firms even within an industry and within a region; however, their wage premiums diminish after controlling for plant and worker characteristics. Therefore, the higher wages of exporters and domestically owned MNEs reflect the fact that these organizations tend to be larger and employ relatively higher skilled workers, although they do not pay higher wages for identical workers. In this sense, this study does not support the international rent sharing hypothesis supposed by theoretical studies such as Helpman et al. (2010) and Egger and Kreickemeier (2013).

[8] Table 7 presents the test for the equality of the coefficients between firm types.

In addition, the results from QRs reveal that the wage premiums vary across the quantiles of wage distribution. In foreign-owned firms, the wage premium is larger in higher quantiles of wage distribution, suggesting that higher skilled workers obtain larger wage premiums in foreign-owned firms. In contrast, the wage premiums for exporters and domestically owned MNEs are smaller in higher quantiles of wage distribution and even negative in the upper quantiles. These surprising evidences are not predicted by the existing theoretical studies that assume the uniform wage premiums across the quantiles of wage distribution and require for the further development of theoretical studies of the wage premiums.

This study suggests that nationality, rather than the multinational status or exporting status, matters for wage premiums. It, therefore, does not support the theoretical models that assumes foreign sales due to FDI or exporting is a key to wage premiums. Identifying the reason for large unexplained foreign wage premium is beyond the scope of this study. The unexplained foreign wage premium can be attributable to unobservable firm and worker characteristics such as managing practice and employment system that my data cannot control for. Previous studies suggest that the foreign multinational firms' wage premiums can be attributed to compensation for different working conditions (Bernard and Sjoholm 2003; Fabbri et al. 2003) or learning opportunities (Görg et al. 2007) in foreign firms.

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Table 1: Number of firms, plants, and workers by firm type

	No. of firms	No. of plants	No. of workers
Local firms	5,184	5,639	67,957
Local exporters	283	283	5,286
Domestic MNEs	418	463	14,468
Foreign-owned firms	40	55	1,879
Total	5,925	6,440	89,590

Table 2: Descriptive statistics of hourly wage by firm type (2012)

	N	min	mean	median	max	sd
Local firms	67,957	0.18	19.28	17.19	175.53	9.30
Local exporters	5,286	4.64	22.28	20.28	179.58	10.01
Domestic MNEs	14,468	6.59	31.19	27.38	183.65	15.71
Foreign-owned firms	1,879	8.34	36.40	31.49	144.13	18.43
Total	89,590	0.18	21.74	18.62	183.65	11.92

Note: The hourly wage is in 100 yen.

Table 3: Wage premium (2012): OLS with regional and industry fixed effects

	(1)	(2)	(3)	(4)
	No	Region FE	Industry FE	Both FEs
EXPORTER	0.163***	0.142***	0.131***	0.111***
	[0.019]	[0.018]	[0.018]	[0.017]
JMNE	0.465***	0.337***	0.447***	0.317***
	[0.020]	[0.016]	[0.019]	[0.016]
FOR	0.555***	0.501***	0.512***	0.459***
	[0.041]	[0.038]	[0.041]	[0.034]
Constant	2.856***	2.806***	2.758***	2.728***
	[0.006]	[0.026]	[0.020]	[0.032]
Observations	82393	82393	82393	82393
R-squared	0.158	0.226	0.189	0.257

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.
The dependent variable is the log of hourly wage. Industry and region fixed effects (FEs) are suppressed. Robust standard errors are clustered at the firm level and are indicated in square brackets.

Table 4: Wage premium (2012): OLS with plant and worker characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline		Non-exporters		No. of subsidiaries	
EXPORTER	0.036**	0.004			0.035**	0.010
	[0.015]	[0.013]			[0.015]	[0.013]
JMNE	0.080***	0.003	0.078***	-0.005		
	[0.015]	[0.012]	[0.019]	[0.015]		
FOR	0.309***	0.195***	0.286***	0.175**	0.299***	0.199***
	[0.068]	[0.060]	[0.106]	[0.084]	[0.066]	[0.059]
HIGH_SCHOOL		0.088***		0.085***		0.087***
		[0.007]		[0.008]		[0.007]
JUNIOR_COLLEGE		0.126***		0.123***		0.124***
		[0.009]		[0.009]		[0.009]
COLLEGE		0.224***		0.212***		0.219***
		[0.009]		[0.009]		[0.009]
EXP		0.037***		0.036***		0.037***
		[0.001]		[0.001]		[0.001]
EXP2		-0.000***		-0.000***		-0.000***
		[0.000]		[0.000]		[0.000]
REGULAR		0.320***		0.317***		0.321***
		[0.014]		[0.015]		[0.014]
TENURED		0.121***		0.123***		0.121***
		[0.016]		[0.017]		[0.016]
WHITE_BLUE		0.151***		0.155***		0.149***
		[0.004]		[0.005]		[0.004]
ln N_MNE					0.046***	0.014**
					[0.008]	[0.007]
Constant	3.207***	2.143***	3.260***	2.216***	3.138***	2.130***
	[0.046]	[0.039]	[0.052]	[0.044]	[0.054]	[0.042]
Observations	82393	77266	68975	63982	81375	76248
R-squared	0.346	0.635	0.313	0.605	0.343	0.632

***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The dependent variable is the log of hourly wage. Industry and region fixed effects are suppressed. Robust standard errors are clustered at the firm level and are indicated in square brackets. Firm size dummies and plant type (single plant, headquarter, and subsidiary) dummies are included in all regressions of columns (1)–(6), but their estimated coefficients are suppressed.

Table 5: Wage premium (2012): quantile regression with plant and worker characteristics

	(1)	(2)	(3)	(4)	(5)
quantile	0.10	0.25	0.50	0.75	0.90
EXPORTER	0.033***	0.019***	0.005	-0.013***	-0.017***
	[0.007]	[0.005]	[0.005]	[0.004]	[0.004]
JMNE	0.017***	0.010***	-0.002	-0.012***	-0.020***
	[0.002]	[0.003]	[0.002]	[0.003]	[0.005]
FOR	0.054	0.108***	0.147***	0.169***	0.257***
	[0.035]	[0.033]	[0.023]	[0.016]	[0.033]
HIGH_SCHOOL	0.096***	0.086***	0.081***	0.105***	0.116***
	[0.005]	[0.002]	[0.004]	[0.007]	[0.006]
JUNIOR_COLLEGE	0.123***	0.116***	0.120***	0.155***	0.161***
	[0.002]	[0.007]	[0.008]	[0.014]	[0.018]
COLLEGE	0.214***	0.207***	0.215***	0.261***	0.287***
	[0.011]	[0.005]	[0.001]	[0.009]	[0.009]
EXP	0.036***	0.036***	0.037***	0.039***	0.041***
	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]
EXP2	-0.001***	-0.001***	-0.000***	-0.000***	-0.000***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
REGULAR	0.347***	0.338***	0.305***	0.272***	0.242***
	[0.017]	[0.017]	[0.017]	[0.017]	[0.010]
TENURED	0.145***	0.151***	0.146***	0.120***	0.095***
	[0.013]	[0.015]	[0.017]	[0.020]	[0.025]
WHITE_BLUE	0.128***	0.124***	0.130***	0.149***	0.173***
	[0.004]	[0.004]	[0.001]	[0.003]	[0.001]
Constant	1.781***	1.959***	2.167***	2.312***	2.471***
	[0.015]	[0.004]	[0.003]	[0.009]	[0.036]
Pseudo R-squared	0.3524	0.3823	0.4139	0.442	0.4601
Observations	83922				

***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The dependent variable is the log of hourly wage. Industry and region fixed effects are suppressed. Standard errors are indicated in square brackets. Firm size dummies and plant type (single plant, headquarter, and subsidiary) dummies are included in the regressions, but their estimated coefficients are suppressed.

Appendix

Table 6: Descriptive statistics for the estimation (2012)

variable	N	min	mean	max	median	sd
ln HOURLY WAGE	173429	-2	3.0456	5.21	3.0184	0.47
EXPORTER	173662	0	0.03	1	0	0.17
JMNE	90251	0	0.16	1	0	0.37
FOR	162332	0	0.01	1	0	0.11
N_MNE	88987	0	4.04	941	0	30.74
JUNIOR_HIGH_SCHOOL	173662	0	0.04	1	0	0.19
HIGH_SCHOOL	173662	0	0.62	1	1	0.49
JUNIOR_COLLEGE	173662	0	0.08	1	0	0.27
COLLEGE	173662	0	0.26	1	0	0.44
EXP	173662	0	20.53	44	20	10.94
EXP2	173662	0	541.14	1936	400	473.41
REGULAR	173662	0	0.94	1	1	0.24
TENURED	173662	0	0.94	1	1	0.23
WHITE	167442	0	0.38	1	0	0.49
FIRMSIZE: 5000–	173662	0	0.13	1	0	0.33
FIRMSIZE: 1000-4999	173662	0	0.17	1	0	0.37
FIRMSIZE: 500–999	173662	0	0.09	1	0	0.29
FIRMSIZE: 300-499	173662	0	0.09	1	0	0.29
FIRMSIZE: 100-299	173662	0	0.21	1	0	0.41
FIRMSIZE: 30–99	173662	0	0.18	1	0	0.38
FIRMSIZE: 10–29	173662	0	0.10	1	0	0.30
FIRMSIZE: 5–9	173662	0	0.04	1	0	0.19
SINGLE_PLANT	173635	0	0.26	1	0	0.44
HEADQUATER	173635	0	0.26	1	0	0.44
SUBSIDIARIES	173635	0	0.48	1	0	0.50

Table 7: Test for the equality of the coefficients between firm types

		q10		q25		q50		q75		q90	
JMNE-EXPORT	Difference	-0.016	**	-0.010	**	-0.007	**	0.001	**	-0.003	**
	S.E.	(0.006)		(0.003)		(0.002)		(0.003)		(0.004)	
	p	(0.012)		(0.002)		(0.002)		(0.680)		(0.394)	
FOR-EXPORT	Difference	0.021		0.089	**	0.142	**	0.182	**	0.274	**
	S.E.	(0.035)		(0.029)		(0.019)		(0.013)		(0.034)	
	p	(0.546)		(0.002)		(0.000)		(0.000)		(0.000)	
FOR-JMNE	Difference	0.037		0.098	**	0.150	**	0.181	**	0.277	**
	S.E.	(0.033)		(0.030)		(0.021)		(0.013)		(0.030)	
	p	(0.267)		(0.001)		(0.000)		(0.000)		(0.000)	

** indicates significance at the 5% level.

Table 8: Test for the equality of the coefficients between quantiles

		EXPORTER		JMNE		FOR	
q10-q25	Difference	0.014	**	0.008	**	-0.054	**
	S.E.	(0.005)		(0.001)		(0.005)	
	p	(0.004)		(0.000)		(0.000)	
q25-q50	Difference	0.014	**	0.012	**	-0.039	**
	S.E.	(0.000)		(0.002)		(0.011)	
	p	(0.000)		(0.000)		(0.000)	
q50-q75	Difference	0.018	**	0.009	**	-0.022	**
	S.E.	(0.003)		(0.001)		(0.010)	
	p	(0.000)		(0.000)		(0.024)	
q75-q90	Difference	0.004		0.009	*	-0.088	**
	S.E.	(0.005)		(0.005)		(0.019)	
	p	(0.440)		(0.091)		(0.000)	

** and * indicate significance at the 5% and 10% levels, respectively.