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Wages, overseas investment and ownership: implications for internal labor markets in Japan

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Japanese firms expanded their outward foreign direct investment (FDI) rapidly in the emerging economies in Asia in the post-1990 period. The Japanese public feared that companies would increasingly rely on cheaper foreign workers and that large numbers of home country workers would find their responsibilities, and hence their earnings, dwindling over time. However, using several recent data sets on workers in firms with and without FDI investments, we show that workers received earnings premiums if they were with firms that engaged in outward FDI involving ownership of at least 50% in some foreign firm. Higher ranked workers benefited more, but even some non-managerial workers did benefit as well. These wage benefits crucially depend on the level of ownership in FDI projects. Increased foreign employment, on the other hand, did not benefit workers' wages except those in the highest ranks.

Keywords: foreign direct investment; Japan; Japanese management; Japanese wages

Introduction

Outward foreign direct investment (FDI) has stirred fears in Japan. Ando and Kimura (2007) explain that 'Japanese firms have been major players in international production and distribution networks, especially in the manufacturing sectors.' They go on to note that, 'As these firms have expanded their manufacturing operations in labor-abundant neighbors such as China, some in Japan have shared the fears expressed in Europe and North America about the impact of firms investing abroad to take advantage of the large wage gap between developed and developing countries.'[1] Freeman (1995) questioned if wages of less-skilled workers in the West were set in Beijing. Nevertheless, in the post-bubble recession period, the Japanese government explicitly encouraged outward FDI. The belief was that this would help Japanese companies achieve a division of labor that would better support their global business activities in years to come.[2] Judged by their actions, many Japanese manufacturing firms agreed with the government position. Certainly many businesses rapidly expanded their outward FDI in the post-bubble years.

In Japan, regular workers in firms rarely quit or are laid off.[3] Given national norms of good behavior, neither the workers nor the employers are free to end established regular employment relationships without potentially being branded as unreliable. In addition, Japan's employment laws generally discourage layoffs. Being branded as unreliable is feared by employers because of the likely negative impacts on the ability to hire high quality new graduates in the annual recruiting season (e.g. Tsurumi 1984; Aoki 1988). However, when certain groups of regular workers within a Japanese firm become less

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needed because of technological or other structural changes, those workers will find their responsibilities diminished if they cannot be moved into other sorts of operations, and workers with lesser responsibilities get smaller bonus payments, and can sometimes have their regular wages reduced as well.

Bonus payments matter in Japan. In good years, for workers who are needed by a firm, the bonus payment component of their annual earnings can be a third or even more. In Japan, bonuses are paid to all regular workers including those at both non-managerial and managerial ranks. This flexibility of the Japanese compensation system is helpful for testing the effects of interest in this study. If the public fear were well sensed that outward FDI would make many types of home country workers redundant, then total average remuneration per month would be expected to be lower for workers in firms engaged in outward FDI.

The first purpose of this paper was to develop a conceptual explanation of how outward FDI could lead to higher earnings for Japanese workers with firms that undertake outward FDI. The second purpose was to empirically test the hypothesized earnings effects of outward FDI in Japan. In order to test some hypotheses about how Japanese workers are affected by the outward FDI activities of their firms, we estimate a wage equation for workers using linked worker-establishment-firm data. The linked worker-establishment-firm data we use are a vast improvement over aggregate data or micro data for workers without employer characteristics, though still not ideal in a variety of ways discussed subsequently for our purposes. Also, the data do cover all parts of the Japanese manufacturing sector.

The organization of the article is as follows. In Section 'The conceptual framework and four hypotheses,' we discuss theories of others that seem relevant for understanding how home country internal firm labor markets in Japan are affected by the outward FDI activities of Japanese firms. Our hypotheses that are presented at the end of Section 'The conceptual framework and four hypotheses' are based on theories that seemed promising given the empirical findings of others and Japanese institutions and customs. In Section 'Controlling for worker, establishment, and firm heterogeneity,' we introduce the main predetermined attributes we control for in estimating the impact of outward FDI on worker wages. Section 'Our wage equation and data samples' introduces the wage equation we estimated for different work groups, and our data. We use the wage equation coefficients to test our hypotheses. Our empirical results are presented and discussed in Section 'Empirical results'. 'Concluding remarks' concludes.

The conceptual framework and four hypotheses

The primary objective of this article was to estimate the impacts of Japanese firms' outward FDI on the earnings of their domestic workers using matched worker-establishment-firm data. The worker earnings information in our data set is the monthly average of earnings of all sorts over a year from the main employer, referred to hereafter as the monthly wage. This is a suitable dependent variable for our analysis. In Japan, earnings (including any overtime payments) are paid on a monthly basis. In a world of continuous employment, hours of work for full-time workers are a condition of employment and not a variable which should be divided into wages. However, since the bonus portion of a worker's earnings is paid out only occasionally (twice a year in most Japanese companies), it is necessary to take the average of earnings over the 12 months of a year in order for earnings to be comparable for workers with different firms. In North America, very few workers receive bonus, but this is not the case in Japan. Moreover, it has been empirically

documented that the use of bonuses by Japanese firms as part of the compensation for virtually all their regular workers helps align the labor component of cost for Japanese firms with business cycle and other sources of earnings fluctuations for firms. The bonus component of Japanese wages is far more variable than the regular pay component.[4]

Some analysts argue that horizontal FDI directed mostly towards advanced economies increases the home country demand for labor, while vertical FDI seeking mostly cost savings in developing countries reduces the home country demand for labor (e.g. Blomström, Fors and Lipsey 1997; Braconier and Ekholm 2000; Mariotti, Mutinelli and Piscitello 2003). Significant portions of Japanese FDI in the post-bubble period are believed to have been primarily of the vertical, cost-saving sort. Discussions about this in the Japanese language popular press are believed to be part of why this FDI raised the fears it had on the Japanese population.

Other studies present theories that suggest that firms' outward FDI operations can cause changes in both the levels and the nature of firm demand for home country labor (e.g. Agarwal 1997; Feenstra and Hanson 1997; Hansson 2001; Head and Ries 2002; Mariotti et al. 2003). Some of the literature suggests mixed types of association between firms' overseas production activities and home country employment (e.g. OECD 2008). Many Japanese firms have both horizontal and vertical types of FDI operations. However, the information we have in our data on FDI is based on cumulative firm FDI investments and is not accompanied by any sort of indication of the nature or location of the investment.

Nevertheless, here we develop a rational based on special Japanese human resource practices for why, in Japan, outward FDI might realistically be expected to lead to wage gains for the Japanese workers with firms undertaking FDI. Joint ownership can result in involvement in and influence on key decisions where the objectives of a foreign partner are poorly aligned with the parent company's objectives and may also result in spillovers of proprietary technologies and instability of FDI arrangements (e.g. Rugman and Collinson 2006, p. 242). Thus, Japanese firms typically try to exert as much control as possible over their foreign operations by securing the largest possible ownership shares in these operations. This behavior is consistent with the corporate policies of US firms, for example, that have *only* fully owned overseas subsidiaries in their main lines of business (e.g. IBM, Coca Cola). However, most US firms' foreign operations in Japan and elsewhere, whether fully or jointly owned, are managed by nationals of the countries where the business operations are located (e.g. the overseas operations of IBM, Apple, Dell, Microsoft, Sun, and HP). In contrast, Japanese firms' outward FDI are usually managed centrally from the firm headquarters in Japan and by managers and CEOs sent out on rotations to the overseas operations.

Aoki (1988) explains why centralized personnel management has been the norm for Japanese firms. The Japanese practice of using Japanese managers and of doing the planning and product and process development in Japan for their foreign operations is believed to be due, in part, to specific difficulties involved in delegating planning and management functions to foreigners within Japanese firms. Coordinating Japanese-style production methods requires knowledge about the company's operations in Japan (AllBusiness.com 2004; Li 2005). Also, a Japanese firm's outward FDI activities are often conducted jointly with other Japanese firms in the same keiretsu corporate groupings (e.g. Asanuma 1989). And, many Japanese firms view managerial positions in their overseas operations as part of the career paths for management track Japanese workers (see Shiraki 2006a,b). Rotations are used as a way of training future managers about different aspects of company operations.

The practices of Japanese firms for managing their overseas operations are one plausible reason to expect that, for Japanese firms at least, outward FDI might generate more work for home country workers of these firms, especially including those in management positions, and might also create demands for home country workers to acquire new skills for coordinating global operations in production, distribution, new product development, marketing, and accounting. Another important task often associated with Japanese firm outward FDI operations is the training of foreign workers. This training is needed in order for Japanese firms to be able to implement in their overseas plants their just-in-time and other special production and management methods. Japanese firms are reported to invest heavily in training foreign workers hired for their overseas operations. The delivery of this training requires input not only from Japanese managers but also from ordinary Japanese workers who serve as on-the-job instructors when foreign workers are brought into Japanese establishments for training (see Brannen, Liker and Fruin 1999).

The rational we suggest for why expanded outward FDR by Japanese firms might result in gains in average monthly wages for their Japanese workers of these firms could provide a conceptual basis for claims made by the government of Japan in trying to win public support for their FDI policies. However, it is at odds with what might have been expected given some of the theories of others for firms in other nations. Both this fact and the fact that the conceptual rational is based on special features of Japanese human resource management practices make it especially important to find out whether the implications of our rational can be empirically verified.

Four groups of explanatory variables are included in our wage equations: (1) foreign engagement variables – the coefficients of which are used to test the hypotheses we specify; (2) predetermined worker attributes believed to affect worker wages in predictable ways; (3) predetermined establishment and firm attributes believed to affect worker wages in predictable ways; and (4) predetermined establishment and firm attributes that are nuisance factors in the sense that we lack theory-based predictions for the expected effects, and hence cannot use the estimated coefficients for these variables as checks on the appropriateness of our estimated wage equations.

Variable group 1 consists of five variables that characterize the foreign engagement activities of the firms of the workers for which we have wage data. Two of these five variables are outward FDI dummies. The first FDI dummy is set equal to 1 if a worker's firm engaged in outward FDI involving at least 50% ownership of at least one foreign firm. And the second FDI dummy is set equal to 1 if a worker's firm engaged in outward FDI involving 20–50% ownership in at least one foreign firm. Our third foreign engagement variable is the ratio of a firm's regular workers employed outside Japan to the firm's total worldwide workforce including their workforce in Japan. Higher values of this variable mean foreign workers are relatively more important to the firm in terms of the numbers.

The final two foreign engagement variables are for inward FDI dummies. There is some evidence in the literature suggesting that inward FDI connections are associated with higher productivity (see, for example, Lipsey 2004; Fukao, Ito and Kwon 2005; and Lipsey and Sjöholm 2005 for empirical evidence for Japan and other countries). Thus, we include one dummy variable for firms with inward FDI with 50% or more of the firm owned by the foreign investor. And we include a second dummy variable for firms that have inward FDI with 20–50% of the firm owned by the foreign investor.

Based on the conceptual rational we have outlined, it seems plausible that the responsibilities would rise for the Japanese workers of Japanese firms with greater outward

FDI. The rise in home country worker responsibility is expected to be greater for firms with FDI involving a higher ownership share because greater ownership means more operational control. Japanese bonus payments reflect the extent of responsibility carried by workers, which leads us to also expect greater gains for higher rank managers. Indeed, earnings losses for lower rank managers or for non-managerial workers could be consistent with, but are not a necessary implication of, the rational we have outlined. We propose to empirically test the following four hypotheses:

H1: Outward FDI operations increase the earnings of firms' home country workers.
H2: Higher ownership shares in foreign operations translate into earnings premiums for the home country workers of firms undertaking FDI.
H3: Higher ranked home country workers get higher outward FDI-related earnings premiums.
H4: Expansion of outward FDI negatively affects the earnings for lower ranked home country workers.

Controlling for worker, establishment, and firm heterogeneity

Economic theory suggests that workers in higher productivity firms will tend to be better paid. Previous research has also concluded that firms' international business behavior is influenced by heterogeneity in firm's characteristics (e.g. Melitz 2003). In particular, a number of authors have proposed that firms' productivity characteristics are important determinants of which firms in the same industry mobilize to invest overseas (e.g. Damijan, Polanec and Prasnikar 2007). Thus, we must control for productivity effects in order to be able to determine if there are any separate effects on worker earnings of firm's outward FDI.

We can use the predetermined productivity-related variables in our data to replace the potentially endogenous outward FDI variables in our wage equations with instrumental variables (IV), since the consistency of IV estimates does not require the potentially endogenous variables to be continuous. An advantage of the IV formulation is that, taken together with the associated OLS estimation results, a formal statistical test for endogeneity can be carried out (see Greene 1998, Chapter 28). We do this and report the *p*-values for the resulting Durbin–Wu–Hausman (DWH) test statistics.[5] These results imply that we can use the OLS wage equations, which have the advantage that the coefficient estimates are more efficient than the IV coefficient estimates under the null hypothesis of no endogeneity.

However, we also include in our final OLS equations all of the predetermined productivity-related variables, which should help control for the possibility that the coefficients on our outward FDI dummy variables otherwise pick up firm and worker productivity effects on wages. We also show estimation results for multiple types of workers.[6] In the rest of this section, we note the various predetermined control variables that we have included in the wage equation. These are the same variables that were included in the first stage IV equations used in computing the DWH statistics for which we show *p*-values (in row 4.4 of Table 1), with the exception of the three city dummies for the locations of establishments. We know of no reason to expect that the locations of a firm's establishments within Japan would affect the likelihood of firms engaging in outward FDI, though there are reasons which must be controlled for in our wage equations for why establishments in more expensive cities would tend to pay their workers more.

Table 1. Wage equations for stated groups of workers in Japanese manufacturing establishments.

	1 Division heads	*2 Section heads*	*3 Non-managers in other establ.*	*4 Non-managers in head office establ.*	*5 Non-managers, pooled, all establ.*	*6 All workers, pooled, for other establ.*
1. Foreign engagement variables (from the 2001 EECensus)						
1.1 Outward FDI with 50% or more ownership (Out50 +)	0.055[a]	0.040[a]	0.041[a]	0.030[a]	0.043[a]	0.042[a]
1.2 Outward FDI with 20–50% ownership (Out20–50)	0.038[a]	−0.004	0.006	0.002	0.012[c]	0.011[c]
1.3 Foreign to total employment (F/T)	0.080[c]	−0.048	−0.036	−2.269	−0.050	−0.0006
1.4 Inward FDI with 50% or more ownership (In50 +)	0.274[a]	0.336[a]	0.269[a]	1.500	0.274[a]	0.294[a]
1.5 Inward FDI with 20–50% ownership (In20–50)	0.048[b]	0.052[a]	0.054[a]	−0.008	0.059[a]	0.062[a]
2. Control variables for predetermined worker attributes (from the 2002 wage survey)						
2.1 University education (EDU4)	0.262[a]	0.215[a]	0.353[a]	0.330[a]	0.368[a]	0.352[a]
2.2 Junior college education (EDU3)	0.120[a]	0.130[a]	0.250[a]	0.251[a]	0.264[a]	0.250[a]
2.3 High school education (EDU2)	0.129[a]	0.079[a]	0.168[a]	0.168[a]	0.180[a]	0.169[a]
2.4 Junior high education (EDU1)	–	–	–	–	–	–
2.5 Tenure	0.006[a]	0.123[a]	0.022[a]	0.017[a]	0.021[a]	0.021[a]
2.6 Age	0.003[a]	0.005[a]	0.002[a]	0.004[a]	0.003[a]	0.003[a]
2.7 Gender (female = 1)	−0.107[a]	−0.126	−0.285[a]	−0.310[a]	−0.287[a]	−0.287[a]
3. Control variables for predetermined establishment and firm attributes (from the EECensus)						
3.1 Size measured by total employment of the firm (1000s) (Size)	0.06[a]	0.04[a]	0.03[a]	0.06[b]	0.03[a]	0.04[a]
3.2 In one of Japan's 11 largest cities (L-City)	0.112[a]	0.092[a]	0.098[a]	0.057	0.104[a]	0.099[a]
3.3 In one of Japan's prefectural capital cities (C-City)	0.040[a]	0.016[a]	0.044[a]	0.051	0.046[a]	0.041[a]
3.4 In a city with a population of at least 300,000 (M-City)	0.027[a]	0.018[a]	0.015[a]	−0.008	0.015[a]	0.294[a]
3.5 TFP growth (TFPG)	−0.357	−0.074	0.174	−0.489	−0.375[b]	−0.336[b]
4. Summary statistics for the estimated equation						
4.1 Number of observations	15,867	35,906	131,075	131,078	262,153	182,848
4.2 Adjusted R squared	0.343	0.514	0.492	0.458	0.475	0.486
4.3 Regression F statistic	74.48	329.10	1086.88	972.86	919.95	741.96
4.4 *p*-value for the Durbin–Wu–Hausman test for endogeneity of the outward FDI variables	0.147	0.229	0.253	0.269	0.141	0.401
4.5 *p*-value for the Studentized Breusch–Pagan test for heteroskedasticity	0.950	0.446	0.381	0.371	0.971	0.170

Notes: 1. Superscript a, b, or c denotes significance levels at 90, 95, and 99%, respectively, using a two-tailed critical region and were obtained using heteroskedasticity-corrected standard errors (not shown here, available on request); 2. In addition to the explanatory variables shown above, the following control variables were also included in our regressions: a dummy variable for whether the firm owns 50% or more of one or more domestic firms; a dummy variable for whether the firm owns 20–50% of one or more of domestic firms; a dummy variable for whether the firm is owned 50% or more by another domestic firm; a dummy variable for whether the firm is owned 20–50% by another domestic firm; a variable for the total number of suppliers and workers from other firms dispatched to the firm for operational objectives; the ratio of firm's temporary workers to regular workers; a four-firm concentration ratio defined by the market share, as a percentage, for the four largest firms in the industry; a dummy variable for whether the firm is 20–50% owned by another Japanese firm; a dummy variable for whether the firm owns more than 50% of another Japanese firm; a dummy variable for whether the firm owns 20–50% of another Japanese firm; and industry dummies. In addition, we added head office dummies for the column 5 regression; 3. The short variable names given in parentheses, following the full name for each of the variables, are used in the appendix tables where we show descriptive statistics for these variables.

Control variables for worker heterogeneity

We include six variables in our wage equation to account for the impact on worker wages of predetermined personal attributes. From the outset of their employment relationships, employers assign new workers to tasks with different requirements depending – among other things – on differences in their educational qualifications. Also, educational attainment often functions as a proxy for unobservable worker traits such as intellectual ability – the significance of which will not diminish over time. In our wage equations, we include the dummy variables available in our data sets for university education, for junior college or professional school education, and for senior high education, with the omitted dummy variable being for workers with less than a high school education.

Tenure is a continuous variable for the number of years a worker has been with the same employer. This variable controls for the variation in wages due to the length of employment with the current employers. Worker age is also included. The relatively rare workers who previously worked somewhere else are the main ones whose wage rates would not be well predicted using only their tenure with the current employer. The magnitudes of the impacts of worker tenure and age on Japanese wages tend to exceed those found for US workers (e.g. Mincer and Higuchi 1988). Finally, a gender dummy variable – set equal to 1 if a worker is female – is included to allow for the systemic Japanese firm practice of paying employees who are women less than observationally equivalent men, and any other systematic male–female productivity-associated effects we are unable to control for with our data such as lower hours of work for female workers (since we have no hours of work information). Gender-based wage differentials are typically found to be larger for Japanese female workers than their US counterparts (e.g. Blau and Kahn 2003).

Information on these worker attributes was collected at the same time as the earnings information. We note, however, that the formal education qualifications, tenure, age, and gender attributes were, by their nature, all predetermined as of when this information was collected.

Control variables for establishment and firm heterogeneity

We include five variables to account for establishment and firm attributes that are believed to affect worker wage rates. The first is a variable for the total employment of a worker's firm, including all regular workers, part-time workers, and temporary workers. Some empirical evidence of others suggests that firm size has positive effects on firm's productivity[7] (e.g. Abowd, Kramarz and Margolis 1999).

We include three city type variables. The first is a dummy variable set equal to 1 if the establishment the worker is with is located in a city that is among the 11 largest in Japan. The second is a dummy variable set equal to 1 if the worker's establishment is located in a prefectural capital city. And the third is a dummy variable set equal to 1 if the worker's establishment is located in a city with a population of at least 300,000 people. (The omitted city type dummy is for workers who are with establishments for which all three of the above city dummies equal zero.) Many studies have found that work done in large cities is generally associated with high levels of innovation and productivity (e.g. Yankow 2006). These studies claim to substantiate that city dummies control for variations in productivity among firms, their establishments, and workers. We also include a measure of the 2000–2001 total factor productivity growth (TFPG) for the industry a firm is part of. This productivity growth variable is calculated by the government of Japan using a Törnqvist

index and detailed industry level data on capital, labor, energy, material and services inputs as well as gross output.[8]

As noted at the start of Section 'The conceptual framework and four hypotheses,' we also include some establishment and firm predetermined attributes that others have suggested are likely to affect firm productivity and wages, but where clear evidence on the signs of the effects is lacking. These other control variables include industry dummies[9] and are listed in note 2 to Table 1.

Our wage equation and data samples

In order to test hypotheses H1–H4 stated at the end of Section 'The conceptual framework and four hypotheses,' we use the following wage equation as a framework for addressing the stated hypotheses. We assume that worker i's wage (w_i) varies systematically as follows:

$$\begin{aligned}\ln w_i = {} & \alpha_0 + \text{Vector of foreign engagement variables}\cdot\alpha_1 \\ & + \text{Vector of variables controlling for predetermined worker attributes}\cdot\alpha_2 \\ & + \text{Vector of variables controlling for predetermined firm and establishment attributes}\cdot\alpha_3 \\ & + u_i, \end{aligned} \tag{1}$$

where the α's are the coefficients to be estimated and u is an equation error term, the properties of which are discussed below. The data used in this study are introduced next. We then discuss our treatment of certain econometric issues.

Our data

The wage observations in our data come from the 2002 Basic Survey of Wage Structure, referred to hereafter simply as the wage survey. The establishments included in the wage survey for a particular year are chosen using stratified sampling from the 2001 Establishment and Enterprise Census, referred to hereafter as the *EECensus* (see JMHLW 2006). The EECensus is conducted every three to 5 years and covers all privately owned establishments in Japan with at least 10 workers. For each establishment covered in the wage survey data set, wage and other information is collected for randomly selected regular (i.e. continuing and full time) workers with these establishments. Because of these aspects of how the data are collected at the source, information about the establishments and the firms to which the establishments belong is lagged 1 year vs. the wage observations for workers. Thus, in essence, even in our OLS equations, the firm and establishment variables including the foreign-involvement ones are instrumented using the corresponding 1-year lags of the current period variables.

Two types of establishments are distinguished in the data: establishments which are head offices and other establishments consisting of manufacturing facilities (OE). By the design of the data samples released to us, it is not possible to connect firms' head offices to their other establishments.

Organizationally, it is important to consider how wage impacts relate to workers' rank-specific responsibilities. Workers are classified as non-managerial workers; section heads, which are lower-rank managers (called Kakaricho in Japan); and upper-rank managers (called Bucho in Japan).[10] We were given samples of data for specific categories of regular workers, with these samples being drawn by the data provider from the full-linked data set. More specifically, we were given data for (1) division heads at all establishments, (2) section

heads at all establishments, (3) workers in non-managerial positions at other establishments, and (4) workers in non-managerial positions at head office establishments.[11] We estimated our wage equation for each of these groups of workers. The estimation results shown in the first four columns of Table 1 are for these four groups, respectively. In the final two columns, we show coefficient estimates for the wage equation re-estimated using data samples that combine observations from stated ones of the four basic samples defined above. Descriptive statistics are given in Appendix 1.

In our discussion of the estimated wage equations below, we focus on the wage effects of the outward FDI variables. This research complements the previous empirical work which has investigated the role of inward FDI on labor demand (e.g. Lipsey 2004; Lipsey and Sjöholm 2005).

Econometric specification issues

We first use formal statistical tests for the heterogeneity of the error term and endogeneity. We use the studentized Breusch–Pagan test statistic to test for heteroskedasticity in the wage equation error term, and find that the level of heteroskedasticity is statistically insignificant.[12] Nevertheless, to account any remaining heteroskedasticity in our wage regressions, we use White's heteroskedasticity-corrected standard errors (White 1980). We also use the DWH statistic[13] to test for the endogeneity of our outward FDI dummies.[14] Since these test results suggest that endogeneity of the type we are concerned with here is statistically insignificant, our use of OLS results is justified. In the rest of this article we discuss the OLS results. We emphasize as we noted in Section 'Controlling for worker, establishment, and firm heterogeneity' that our estimation strategy is to try as much as possible, with the variables available to us, to control our wage equations for predetermined factors that affect firm and worker productivity, and hence wage rates.

In addition, as reported in the last part of Section 'Discussion of the estimation results,' we subject our OLS results to a variety of other checks. In particular, we use the estimation results for the four samples of workers defined above to look for departures from a priori-expected coefficient signs. Bias problems affecting the coefficients of the foreign-involvement variables would also likely affect the estimated coefficients of the control variables that are determinants of firm's productivity.

Empirical results

Our final OLS estimates of the coefficients in Equation (1) for which we have sign expectations are shown in Table 1 for five different samples of workers.[15]

Discussion of the estimation results

Do outward FDI activities increase the wages of home country workers in the firms undertaking these activities? That is the question implied by our first hypothesis, and the first question we seek to answer using the Table 1 results. The results in rows 1.1 and 1.2 imply a clear yes to this first question, provided that a firm has at least a 50% ownership stake in at least one of the overseas businesses the firm invested in.

The answer is also yes to the question implied by the second hypothesis: does a higher ownership share translate into wage premiums for the workers of firms engaged in outward FDI? The coefficient estimates are consistently more positive for the outward FDI variable for firms with at least a 50% ownership stake, vs. those with a 20–50% ownership stake,

in at least one foreign business. Indeed, it is only for the sample of division heads that the coefficient is significantly different from zero for the 20–50% outward FDI dummy.

The question that must be addressed for hypothesis H3 is whether higher ranked workers get bigger wage premiums as a result of the FDI activities of their firms. For this question, we need to compare the coefficient estimates in the different columns of Table 1 for the first two variables. In columns 1 through 3, the worker rank declines moving from left to right. Looking at the coefficients in these columns of rows 1.1 and 1.2, we see that the main measured difference arises between the division heads (column 1) and the others (the column 2 and 3 entries). Division heads get a wage premium for being in a firm with outward FDI and an ownership share of at least 20%. Section heads are only found to get a premium if the ownership share is at least 50%. Moreover, the estimated coefficient for the 50% + dummy is significantly smaller for the section heads than for the division heads.

Columns 3–6 show four different ways of estimating the wage effects for non-managerial workers. For column 3, the data set has been limited to non-managerial workers in other establishments, whereas column 4 is for non-managerial workers in head office establishments. Column 5 gives results for wage equations estimated with the observations pooled for non-managerial workers in both head office and other establishments. Finally, for column 6, all the worker observations available to us for other establishments have been pooled.

It is the non-managerial workers we focus on for our last hypothesis H4. The key question implied by this hypothesis is whether there is evidence of negative impacts of outward FDI expansion on the wages of non-managerial workers. Looking at the first two rows of numbers in columns 3–6 of Table 1, we see only positive entries, though only the coefficients for the 50% + outward FDI dummy are significantly positive.

In the top panel of Table 1, the only variable for which most of the estimated coefficients are negative is the one for the ratio of the firm's foreign to total employment. However, only the column 1 coefficient, for division heads, is significantly different from zero, and that coefficient is positive in sign.

The last two panel 1 variables are for inward FDI. A number of researchers have reported finding for various countries that inward FDI is associated with higher wages. We find this too for all of our worker groups except for non-managerial workers in head office establishments, with the estimated coefficient being considerably larger for the case of 50% or greater vs. 20–50% ownership.

Note, finally, that the other control variables for which coefficient estimates are shown in Table 1 all have the anticipated signs when significantly different from zero, with the exception of the coefficients of the TFPG variable that are sometimes significantly negative. For the education variables in panel 2 of Table 1, the measured pattern of wage decline is roughly the same moving from higher to lower education levels. Looking at rows 2.5 and 2.6, we were interested to find that the positive wage effects of another year of tenure are roughly twice the size of the estimated age effects. And from the last row of panel 2, we see that for non-managerial workers, being female has an impact of roughly the same magnitude as having a university level education, but with the opposite sign. However, being female has less of a negative wage effect for managers (with the impact reduced even more than the also lesser effect of a university education). Also, except for the final two columns, the negative coefficients for the TFPG variable are not significantly different from zero.

The final two columns are where we pooled over different sorts of workers (column 5) or different sorts of establishments (column 6). With the pooled data sample for column 5, we could also include interaction terms for the outward FDI dummies and the dummy

variables for the two management categories of worker type (Division head and Section head), leaving the non-managerial workers in other establishments as the omitted category. The estimated coefficients for these regressions for the interaction terms as well as the other foreign engagement variables and the education and TFPG variable are shown in Table 2.

In Table 2, notice that the coefficient of the TFPG variable is now positive, but insignificantly different from zero, and the coefficients shown for other key control variables are changed only slightly from the column 5 values shown in Table 1. The coefficient values for the other foreign engagement variables (in rows 1.3–1.5) are also very similar to the corresponding Table 1, column 5 values. Looking now at the key cross product variables shown in rows CR.1–CR.4 at the top of the Table 2, we see that only the coefficient for division heads in firms engaging in outward FDI with ownership of at least 50% is significantly positive, and this coefficient value is about four times the magnitude of the corresponding Table 1, column 5, row 1.1 coefficient. We note also that, again, there are no significantly negative coefficients. Moreover, the constant term for this regression (which is not shown) is insignificantly different from zero.

We feel that the estimation results using data sample for the different worker types are more appropriate. However, if the Table 2 pooled regression results are used instead, we still find no evidence of a negative effect of outward FDI on any category of worker, and division heads at least seem to have benefited.

Concluding remarks

We have presented empirical evidence based on data spanning the entire Japanese manufacturing sector that shows that Japanese workers enjoy wage premiums if they are with firms engaged in outward FDI to the extent of having at least 50% ownership in at least one foreign firm. We have also shown that workers of higher rank benefit more than workers in lower rank. In fact, those at a director level also benefit from outward FDI with only a 20–50% ownership share.

The worker wage premium from outward FDI is estimated to be only a fifth or less of the wage premium from inward FDI, given a similar ownership share range. One could conclude, therefore, that the domestic wage impacts of outward FDI are relatively unimportant compared with those associated with inward FDI. However, the real importance of our results for outward FDI is the consistent finding across worker groups, including non-managerial workers, of a positive rather than a negative effect.[16] The wide spread fear in Japan had been that growth in outward FDI would lead to the redundancy of home country workers. Our main finding is that Japanese workers in firms engaged in outward FDI activities enjoy wage premiums rather than losses. Thus, we are able to rule out the outcome that led to public outcry against outward FDI in Japan: namely, the possibility that firms that engaged in outward FDI would end up paying less to their home country workers.[17]

Using the detailed data on matched worker-establishment-firm characteristics that became recently available, we have shown empirical evidence that is consistent with the observed wage premiums of workers being paid in Japanese firms undertaking outward FDI although the premiums depend on these firms' ownership shares in their FDI projects. Methodologically, whereas our cross-sectional data limit the types of inferences we can make, we have been still able to control explicitly in our estimating equations for the factors which are known to determine the productivity of workers and the establishments and firms where they work. By including these productivity factors as well as industry TFP level as

Table 2. Wage equations for pooled groups of workers.

	All workers, pooled, for other establishments
CR.1 Outward FDI with 50% or more ownership and Division head	0.129[a]
CR.2 Outward FDI with 50% or more ownership and Section head	−0.021
CR.3 Outward FDI with 20–50% ownership and Division head	−0.037
CR.4 Outward FDI with 20–50% ownership and Section head	0.001
1.3 Foreign to total employment (F/T)	0.032
1.4 Inward FDI with 50% or more ownership (In50 +)	0.276[a]
1.5 Inward FDI with 20–50% ownership (In20–50)	0.076[a]
2.1 University education (EDU4)	0.366[a]
2.2 Junior college education (EDU3)	0.262[a]
2.3 High school education (EDU2)	0.179[a]
2.4 Junior high education (EDU1)	–
3.5 TFP growth (TFPG)	0.033
Number of observations	182,848
Adjusted R squared	0.486
Regression F statistic	918.89
p-value for the Studentized Breusch–Pagan test for heteroskedasticity	0.595

Notes: 1. Superscript a, b or c denotes significance levels at 90, 95, and 99%, respectively, using a two-tailed critical region and were obtained using heteroskedasticity-corrected standard errors (not shown here, available on request); 2. The included explanatory variables are all those listed above plus all other variables from panels 2 and 3 and note 2 in Table 1.

predetermined variables in our estimating equations, we were able to limit the potential problems of endogeneity to a statistically insignificant level. Under the assumption that this extraneous information allows us to control for firm productivity differences, our results show that outward FDI leads to modest wage premiums for workers, with these being somewhat larger for higher ranked managers, but with lower ranked managers and non-managerial workers still enjoying outward FDI-related wage premiums.

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Notes

1. Such public fear was further compounded by the recent remark by Mr Katsuhiko Machida, Chairman of the Sharp Corporation, who said that Sharp and his domestic competitors would eventually have only 20% of their world-wide employment in Japan (Machida 2011).
2. See, for example, METI (1994, 1997, 2000, 2006).
3. This is still true even though the proportion of the so-called regular workers has somewhat shrunken in the Japanese labor force in recent years.
4. Variable bonuses are paid biannually to all regular employees including non-managers. These differ greatly across individuals and over time when considered in relationship to the regular component of worker pay. See Nakamura and Hübler (1998), Nakamura and Nakamura (1991) and Kato and Morishima (2002).
5. Greene (1998, Chapter 28).
6. Heckman (1985) comments on the merit of this approach vs. specification error testing on single data sets.
7. We would also like to control for firm capital, but only have (and hence only use) this information for head office establishments.
8. See RIETI (2008).

9. See note 2 for Table 1 for a full list of the other predetermined control variables included in our wage equation.
10. These categories of hierarchical ranks are commonly used in most private and public organizations in Japan. See also Lincoln, Hanada and McBride (1986).
11. The sampling fractions from all workers of each type in the full linked data set were determined in part so as to provide us with roughly equivalent sample sizes for each of the worker groups of interest and in part by statistical agency confidentiality and data quality considerations. The observations provided to us were randomly selected from the full data set stratified by the designated worker types.
12. This conclusion remained the same when Goldfeld-Quandt and Harrison-McCabe tests were used instead.
13. See, for example, Nakamura and Nakamura (1981) and Davidson (2000, p. 189).
14. We use linear regression for the first stage regression in our IV methods. This is necessary for calculating DWH statistics and also comparing OLS and IV estimates.
15. To save space we report statistical significance without estimated standard errors in Tables 1 and 2. Tables with standard errors are available on request.
16. Another important difference between Japanese inward and outward FDI is that Japan's inward FDI is so tiny compared to their outward FDI that the number of workers associated with foreign firms' FDI in Japan is negligible in the Japanese workforce.
17. We should note also that another serious labor market issue, the loss of employment to low-wage countries due to outward FDI, cannot be addressed using our current framework.

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Appendix 1. Descriptive statistics

Table A1. Workers in different ranks.

	Establishments: non-managerial workers		*Head offices: non-managerial workers*		*Establishments: section heads (section heads)*		*Establishments: division heads (division heads)*	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
ln w	8.162	0.422	8.084	0.416	8.570	0.292	9.027	0.315
1.1 Out50 +	0.045	0.207	0.103	0.304	0.069	0.254	0.107	0.309
1.2 Out20–50	0.028	0.166	0.066	0.248	0.046	0.209	0.067	0.250
1.3 F/T	0.002	0.025	0.004	0.038	0.003	0.035	0.006	0.051
1.4 In50 +	0.002	0.046	0.005	0.070	0.002	0.046	0.005	0.069
1.5 In20–50	0.008	0.086	0.017	0.130	0.014	0.117	0.016	0.125
2.1 EDU4	0.258	0.437	0.246	0.431	0.422	0.494	0.664	0.472
2.2 EDU3	0.131	0.338	0.129	0.335	0.108	0.310	0.059	0.236
2.3 EDU2	0.539	0.498	0.537	0.499	0.437	0.496	0.267	0.442
2.4 EDU1	0.072		0.088		0.033		0.010	
2.5 Tenure	12.798	10.205	11.746	9.736	19.740	9.210	25.133	10.092
2.6 Age	39.110	11.741	39.787	12.066	42.980	7.736	51.765	5.597
2.7 Female	0.287	0.452	0.291	0.454	0.087	0.282	0.017	0.129
3.1 EMP#	292.8	2932.18	335.98	3662.46	664.42	6956.35	566.83	3750.33
3.2 L-City	0.563	1.881	0.538	1.845	0.643	2.39307	0.689	1.920
3.3 C-City	0.369	1.841	0.401	1.820	0.428	2.5082	0.603	2.091
3.4 M-City	0.405	1.872	0.422	1.830	0.479	2.49777	0.622	2.043
3.5 TFPG	−0.003	0.027	−0.004	0.025	−0.001	0.031	0.006	0.027
No. obs.	131,075		131,078		35,906		15,867	

Table A2. Pooled sample: non-management workers at establishments and head offices.

	Establishments: pooled non-managers, section heads and division heads (E-NM) + (E-SH) + (E-DH)				*Pooled non-managers at establishments and head offices (E-NM) + (HO-NM)*			
	Mean	*SD*	*Min*	*Max*	*Mean*	*SD*	*Min*	*Max*
ln w	8.317	1.754	6.238	10.938	8.123	0.416	6.238	10.100
1.1 Out50 +	0.055	0.913	0.000	1.000	0.074	0.304	0.000	1.000
1.2 Out20–50	0.034	0.736	0.000	1.000	0.047	0.248	0.000	1.000
1.3 F/T	0.002	0.025	0.000	0.810	0.003	0.038	0.000	0.800
1.4 In50 +	0.002	0.141	0.000	1.000	0.003	0.070	0.000	1.000
1.5 In20–50	0.009	0.977	0.000	1.000	0.012	0.130	0.000	1.000
2.1 EDU4	0.325	1.721	0.000	1.000	0.252	0.431	0.000	1.000
2.2 EDU3	0.120	1.368	0.000	1.000	0.132	0.335	0.000	1.000
2.3 EDU2	0.495	1.940	0.000	1.000	0.538	0.499	0.000	1.000
2.4 EDU1	0.060		0.000	1.000	0.078		0.000	1.000
2.5 Tenure	15.231	38.686	0.000	61.000	12.272	9.736	0.000	61.000
2.6 Age	40.96	36.421	15.000	79.000	39.448	12.066	15.000	79.000
2.7 Female	0.224	1.691	0.000	1.000	0.289	0.454	0.000	1.000
3.1 EMP#	389	3337	0.000	2272	314	3179	0.000	18833
3.2 L-City	0.590	1.922	0.000	1.000	0.551	1.877	0.000	1.000
3.3 C-City	0.401	1.901	0.000	1.000	0.385	1.832	0.000	1.000
3.4 M-City	0.438	1.927	0.000	1.000	0.413	1.860	0.000	1.000
3.5 TFPG	0.00003	0.027	−0.077	0.062	−0.002	0.026	−0.077	0.062
No. obs.		182,848				262,153		