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Expansion Abroad and Jobs at Home: Evidence from Japanese Multinational Enterprises*

This paper examines the 'exporting job' hypothesis that expansion of overseas operations of manufacturing multinational enterprises (MNEs) reduces home employment using data for Japanese MNEs. While the existing studies are mainly based on the industry level data, this paper presents the evidence using a newly constructed firm-level panel data set over the period 1991-2002. The evidence does not support the widely-held view in Japanese policy circles that that overseas operations of MNEs expand at the cost of home employment. On the contrary, there is some evidence that overseas operations may have helped to maintain the level of home employment.

Key Words: Multinational Enterprises, FDI, Labour demand, , Globalisation
JEL Classification: F14, F16, F23, J23

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Introduction

The debate over the possible adverse effects of overseas production by multinational enterprises (MNEs) on home employment ('exporting jobs') first emerged in the United States in the late 1960s (Kravis and Lipsey 1988). It has gained increased attention in policy circles of industrial countries in recent years with the growing importance of international fragmentation of production (Lipsey 1995; Harrison and McMillan 2006). It also became the subject of heated policy debate in Japan under the label of 'manufacturing hollowing-out' following the spread of production bases of Japanese MNEs to low-cost countries in East Asia from the mid-1980s.

There has been a proliferation of empirical investigations of the 'exporting jobs' hypothesis, using matched parent-affiliates data-sets for MNEs: these include Brainard and Riker (1997), Desai et al. (2009), Hanson et al. (2003) for US MNEs; Bracoiner and Ekholm (2000), and Fors and Kokko (2001) for Swedish MNEs; Navaretti and Casellani (2004) for Italian MNEs; Becker et al. (2005) and Marlin (2006) for German MNEs; and Konings and Murphy (2006) for European MNEs. However, to the best of our knowledge, so far no similar study has been undertaken for Japanese MNEs. This paper fills that gap. The available Japanese evidence on this subject is mainly drawn from the readily-accessable industry-level FDI data on Japan (Fukao 1995; Fukao and Amano

1998; Fukao and Yuan 2001). In addition, a systematic study of Japanese MNEs is important because it is widely believed that their overseas operations have some unique features compared to European and US MNEs (UNCTAD 2002). One of the key distinguishing features is the involvement of small and medium-size enterprises (SMEs) in MNE production networks (Ando and Kimura 2003).

This paper uses a newly constructed firm-level matched parent-affiliates panel data set covering different scales of firms over the period 1991–2002. The data is compiled from the unpublished returns to two annual enterprises surveys of Japanese MNEs parent firms and their foreign affiliates, the *Basic Survey of Business Structure and Activity* and the *Basic Survey of Overseas Japanese Business Activity*, collected by Japan Ministry of the Economy, Trade and Industry (METI) over the period 1991–2002.[1] The METI database is well known for its high quality and reliability (Nishimura et al. 2005; Kimura and Kiyota 2006; Hijzen et al. 2008). In addition, its survey coverage is much greater than the alternative database for Japanese MNEs used in Head and Ries (2001).[2] The analysis is based on estimating labour demand of parent firms, controlling for the industry attributes and specific regional characteristics of overseas operation of MNEs.

The findings of this paper do not support the 'exporting jobs' hypothesis. Instead, there is some evidence of complementary relationship between employment in foreign affiliates of MNEs and their home employment; a 10 per cent increase of foreign affiliate employment leads to a 0.2 per cent increase in home employment. This finding is robust to alternative model specifications that appropriately allow for locations-specific characteristics of foreign affiliates. Thus, this paper alerts to the possibility that, as the globalisation process continues, policy initiatives driven by the public fear of exporting jobs could have the perverse effect of constraining MNE's ability to avert domestic employment contraction by outsourcing some segments of the production process.

The next section summarises the theoretical discussion and the existing empirical evidence on the impacts of overseas operation on the home economic activity of MNEs. Section 3 introduces the econometric specifications, the description of the data and the estimation method, followed by interpretation on the results in Section 4. Section 5 concludes.

Effect of Overseas Operations on Domestic Operations of MNEs

There is no definitive theory about the effects of overseas operations of MNEs on home economic activity. One view argues that for a fixed level of overall production, including parent and affiliate production, any expansion in the overseas operations of MNEs simultaneously reduces domestic operations (the substitution effect). However, this simplistic substitution story ignores the positive effects of overseas expansion on domestic activity. It is equally possible that increased overseas operations might enhance the scale of home economic activity due to better resource allocation and the expanded overseas market (the scale effect). Therefore, the net impact of increased overseas operation on home economic activity can be either positive or negative, depending on the magnitude of the scale and the substitution effects (Hanson et al. 2003).

The net effect of overseas operation can also vary among different types of MNEs (Caves 1996). In general, the theory postulates two types of MNEs, depending on the investment motivation: vertical or horizontal. The former type of MNEs vertically separates the production process between parent MNEs and their foreign affiliates. MNEs of this type are usually motivated to take advantage of the existence of international factor price differentials between home and host country. In this case, overseas and domestic employment can be substitutes, since some domestic operations are directly relocated to overseas locations. However, it is possible that the domestic operation is expanded due to the enhanced production efficiency of vertical specialisation.

The horizontal type of MNE overseas operations are motivated by the objective of expanding overall sales. In this case, expanded overseas operations may either have little effect on the scale of the domestic operation of MNEs or their domestic operations may even expand due to the expanded worldwide scale of production.[3]

Beyond this theoretical classification of MNE types, the postulated relationship between overseas and domestic employment might also depend on the extent to which overseas operations are located in developed as opposed to developing countries, and also whether foreign affiliates have plant-level or firm-level economies of scale. To date, the theory of MNEs does not provide clear-cut predictions about the possible effects of foreign production on home operations.

The extensive empirical research on the effects of overseas operations on home operations is based on US MNEs (Kravis and Lipsey 1988; Lipsey 1995; Brainard and Riker 1997; Hanson et al. 2003; Desai et al. 2005; Harrison and McMillan 2006). These studies make use of firm-level survey data from the Bureau of Economic Analysis (BEA), the US Department of Commerce.[5] Despite using the same data-set, the evidence is, at best, mixed: Kravis and Lipsey (1988), Lipsey (1995), Brainard and Riker (1997) and

Harrison and McMillan (2006) found some degree of labour substitution between foreign affiliates and home operations. On the other hand, Hanson et al. (2003) and Desai et al. (2005) found evidence for employment complementary between foreign and home.

Studies on MNEs for other countries are also contradictory. Muender and Becker (2006) found that jobs growth in foreign affiliates adversely affects employment in German MNEs' parents. While Braconier and Ekholm (2000) uncovered a mild substitution between home and foreign employment in developed countries for Swedish MNEs, Navaretti and Castellani (2004) found no impacts of FDI on employment of Italian MNE parents.

Fukao (1995) makes an early attempt to examine the possible impacts of foreign affiliate production on domestic employment for Japan.[5] Fukao and Yuan (2001) develop a 3-digit level of cross-industry data, concerning the impact of FDI on the employment growth rate over the period 1989 to 1998. The unique feature of their study is the differentiation of FDI by investment motivation and region of the host country. Fukao and Yuan (2001) find that Japanese FDI in East Asia led to shedding of around 600,000 workers at home. They also find that market-oriented FDI in East Asia appeared to increase home country employment.

Head and Ries (2001) use firm-level data for Japanese MNEs from Toyo Keizai. However, their study has a limited scope since their data only covers listed Japanese firms. One of the key distinguishing features of Japanese FDI is the involvement of unlisted small and medium enterprises (Ando and Kimura 2003). The data-set (discussed in the next section) in this paper covers the smaller Japanese firms as well. In addition, Head and Ries (2001) examine the skill effects of overseas operations on Japanese MNE parents without directly investigating the exporting jobs hypothesis.

The Empirical Formulation and Data

The regression analysis is based on a reduced form of labour demand equation widely used in this strand of literature (see Navaretti and Venables, 2004, for a survey). Following Hamermesh (1993), the standard labour demand can simply be written as follows:

$$\ln L_{iht} = \alpha + \beta_1 \ln w_{iht} + \beta_2 \ln Q_{iht} + \beta_3 \ln r_{zht} \quad (1)$$

where subscripts i, h, and t denote parent firm, home country, and time. The dependent variable (L) is the quantity of home employment; w, Q, and r represent own wage rate, output, and the price of capital; α proxies the unobserved features such as the parent firm's level of technology and firm-specific capital. ln indicates natural logarithm. Hence, the log-linear specification offers the direct interpretation of elasticity between factors, holding the output constant (that is, own-wage elasticity and cross-factor elasticity).

The labour demand equation (1) is expanded to incorporate variable capturing overseas operations of foreign affiliate of MNEs (denoted as MNE) and other relevant variables influencing the demand of labour by parent firms. The estimated coefficient of MNE should provide a direct test of the effect of overseas operations on home employment of parent firms. (The variable construction of MNE is detailed in Section 4.1). The 'exporting job' hypothesis suggests the negative coefficient on MNE. On the other hand, the positive coefficient indicates that the scale effects dominate the substitution effects of overseas operations on home employment.

The own-wage rate of home employment is expected to be negatively related with home employment, given a downward sloping labour demand curve (Hamermesh 1993). This would suggest that as the cost of home country workers rises, profit-maximising firms substitute other production inputs.

Product demand shocks both at home and in host countries are included in the model (Brainard and Riker 1997; Braconier and Ekholm 2000; Harrison and McMillan 2006). These variables are expressed by (home) output (Q), time-specific dummy (γ_t) and GDP per capita of host countries (GDPP). Any shocks to product demand are likely to move labour demand in the same direction (Hasan et al. 2007). Positive shocks on product demand are likely to raise the demand for home employment under the assumption of constant returns to scale.

The inclusion of the output scale of parent firms (Q) also controls for the size of parent firms constant when estimating the labour demand equation (Kravis and Lipsey 1988). Time-specific dummies (γ_t) capture pure random shocks to the labour demand equation common to all firms, but varying over time. Similarly, foreign demand is proxied by GDP per capita of host countries. The positive impact of the product market in host countries should translate positively into an increase in home employment (the market expansion effect), while the negative demand shocks depress home employment.

Labour demand for given a level of output also depends on the cost of capital service (r). The sign of cross-factor price indicates the nature of relationship between labour and capital. A positive sign is expected if they are substitutes, and a negative sign if complementary.

The level of technology is proxied by the intensity of R&D (denoted as R&D) as well as by unobserved firm- and industry-specific characteristics (f and φ). The sign of R&D depends on the nature of technological progress. It can substitute for employment of parent firms since the new technology may require fewer operational workers. At the same time, technological progress increases demand for skilled workers, engineers and IT-related personnel. Therefore, a priori, the expected sign for R&D is ambiguous. The unobserved heterogeneity across firms can arise from differences in organisation, the

ageing of capital equipment, the extent of unionisation, the quality of output produced, or the quality of management inputs. Failing to take them into account might lead to permanent observable differences in output, employment and wages (Westbrook and Tybout 1993). Additionally, industry-specific effects take into account industry-wide unobserved technological shocks.

Another factor influencing labour demand is the force of international competition. Tomiura (2004), Bernard et al. (2006) and Ito (2005) confirm that manufacturing employment growth in developed countries is negatively related to a rapid increase of imports from low-wage countries. To control for this effect, import penetration (*IMP*) is included in the model. The expected sign of *IMP* is negative. However, a rapid increase of components imports within manufacturing imports, as documented in Fukao et al. (2003) and Yamashita (2007), may raise the demand for home employment. Hence, the estimates sign of *IMP* could go either way.

Based on the discussion above, the econometrics specification takes the following form:

$$\ln L_{iht} = \alpha_0 + \beta_1 \ln w_{iht} + \beta_2 \ln Q_{iht} + \beta_3 \ln r_{zht} + \beta_4 \ln R\&D_{iht} + \beta_5 \ln IMP_{zht} + \beta_6 \ln MNE_{jft} + \beta_7 GDPP_{ft} + f_i + \varphi_z + \gamma_t + \varepsilon_{i,t} \quad (2)$$

where subscripts z, j and f represent industry, foreign affiliate and host country. The explanatory variables are listed below with the expected sign of each regression coefficient given in the bracket:

w Home wages rate (-)

Q Gross output (+);

r The user cost of capital (+ or -);

R&D Research and development intensity (+ or -);

IMP Import penetration (+ or -);

MNE Employment or outputs of foreign affiliates (+ or -);

PGDPP Host-country GDP per capita (+);

f Firm-specific fixed effect;

ϕ Industry-specific fixed effect;

γ Time-specific fixed effect;

ε Random error term representing other omitted influences.

Construction of the Panel Data[6]

The panel data-set used in this study was compiled from the *Basic Survey of Business*

Structure and Activity (*Kigyo Katsudo Kiho Chosa*) (information on parent firms) the *Basic Survey of Overseas Japanese Business Activity* (*Kaigai Gigyo Katsudo Kihon Chosa*) (information on the corresponding foreign affiliates). Both surveys are conducted by the Ministry of Economy, Trade and Industry (METI) (Appendix 1 discusses each survey in detail). For brevity, the former will henceforth be called the 'METI Firm Survey' and the latter the 'METI Foreign Affiliates Survey'. The data-set covers the period from 1991 when the first METI Firm Survey was conducted to 2002, the latest year for which data are available. There is a gap in data for 1992 and 1993 since the METI Firm Survey was not conducted in these years. The data-set includes parent firms that have both more than 50 employees and capital of more than 30 million yen. The data are at the 3-digit level of Japan Standard Industrial classification (JSIC).

Creating a matched panel data set using these two METI surveys involved the following steps. First, information from both surveys was restricted to manufacturing industry by excluding non-manufacturing industry data. After limiting the data to the manufacturing sector, a consistent 3-digit level of the manufacturing industry classification throughout the period 1991–2002 was assigned to each parent-affiliates. This was needed because there were some changes in the industry classification over the entire time period.

Second, the two surveys were linked by using the permanent identifier assigned to each individual parent firm of the METI Firm survey to the same code reported by each individual foreign affiliate from the METI Foreign Affiliate Survey. To ensure successful matching, careful cross-checking was done by examining the name and the address of parent firms and the ownership structure. This procedure systematically combined information on the overseas operations of Japanese MNEs with domestic economic activity of parent firms.

Third, following Hanson et al. (2003) and Harrison and McMillan (2006), sales weighted averages of foreign affiliate variables were constructed (see section 4.1 for the construction of foreign affiliate variables).[7] This was essential to make the panel data estimation operational, because Japanese parent firms often own several foreign affiliates operating in multiple locations. For instance, Toyota has foreign affiliates in Thailand, the United States, the UK and many other countries.

Lastly, about one per cent of the data was excluded from the original data-set as outliers which reported abnormally large or small values. Parent firms were also dropped if at least one of the values of employment, sales, industry classification, and identification code was missing.

The constructed panel data are also separated into four regional groups of host countries; East Asia, North America, the EU, and South America. The main motivation

for the regional separation was to control for the level of the host country's stage of development, the geographic proximity to Japan, and other region-specific characteristics of foreign affiliates' production. Foreign affiliates of Japanese MNEs operating in developing countries (East Asia and South America) are more likely to be the vertical type of MNEs, whereas those in developed countries (North America and the EU) are more likely motivated by horizontal MNEs. Hence, the postulated employment relationship between home and abroad critically depends on the location of foreign affiliates (see Section 2 for the review).

Variable Construction

We use two different measures of MNE: employment and output of foreign affiliates (MNE^{Q} and MNE^{L}). They are expressed as the weighted average as the weight being the share of worldwide employment and outputs of foreign affiliates. More specifically, the following formula is applied to compute MNE^{Q} and MNE^{L} :

$$(3)` \quad MNE^{L}_{i,j} = \sum_{j=1}^{m} wgt^{j,i} L_{j,f}$$

$$(3)`` \quad MNE^{Q}_{i,j} = \sum_{j=1}^{m} wgt^{j,i} Q_{j,f}$$

The weight (wgt) is the share of foreign affiliate j in the wourldwide (aggregate) foreign affiliate sales of the corresponding parent firm i.[8] GDP per capita of host country is computed in a similar fashion.[9]

Other Variables

The dependant variable (L) is measured by the average number of regular employees.[10] Unfortunately, the skill composition of home employment is not available in the original METI data. Hence, there is no distinction made between skilled or unskilled labour.

Output (Q) is the reported total sales by parent firms. The nominal gross outputs are deflated by Wholesale Price Index (WPI) at industry level taken from the Bank of Japan.[11] The home wage rate is computed by dividing the annual wages and salaries by the annual number of regular workers. Wages and salaries include bonus payments as well as non-wage compensations. The nominal wage series is deflated by the total Consumer Price Index (CPI) taken from the Bank of Japan. The user cost of capital (r) is proxied by wholesales index of investment goods obtained from the same online data-base of the Bank of Japan.[12]

The remaining variables for parent firms are obtained from the METI survey. R&D expenditure refers to average values of R&D expenditure spent on knowledge creation and technological upgrading activity by firms, excluding R&D activities done by other firms. R&D intensity is then computed by taking the share of R&D expenditure of the total sales of parent firms. The import penetration ratio (IMP) is computed taking the ratio of imports to apparent domestic absorption, which is defined as (Outputs + Imports) – Exports, and is constructed at the 3-digit industry level.

Estimation Method

The most important estimation issue is the possible endogeneity of some explanatory variables in Equation (2). MNEs might make a decision on the overseas and domestic operations in terms of employment and outputs simultaneously rather than independently. Therefore, the common factor, which is excluded from the model, could influence either the positive or negative correlation of the OLS regression in the conditional labour demand equation (Desai et al. 2005). In this regard, a generalised method of moments (GMM) instrumental variable (IV) procedure is employed (Griliches and Hausman 1986; Arellano and Bond 1991). This procedure essentially applies instrumental variables to the first-differenced data using the moment conditions. It is often shown in the literature that the lagged values of the potentially endogenous variables in level are potentially useful instruments for the time-differenced variables (Griliches and Hausman 1986; Hasan et al. 2007).

Instrument variables for employment and output of foreign affiliates (MNE) in a host country are the lagged employment output and wage rates of a foreign affiliate, the percentage of the manufacturing labour force and the percentage of national income spent on education. The last two exogenous variables are considered to determine the supply side of labour in the host country, and should only affect home labour market outcomes through their impact on the choice of employment in host country. These variables are taken from online version of the World Bank Development Indicators for each host country.[13]

There is also concern about possible correlation between the output variable (Q) of parent firm and the error term in equation (2). The use of time-dummies, industry- and firm-specific fixed effects to some extent alleviates the potential endogeneity problem (Roberts and Skoufias 1997; Hasan et al. 2007). However, it is still possible that the output variable (Q) is correlated with some parts of the error term which are not covered by the fixed effects. In this case, the instrument variables (IV) approach is employed to deal with this potential endogeneity problem on domestic output. Instruments include the lagged capital stock, the lagged intermediate inputs and lagged output (see the Ap-

pendix for the definitions of these variables).

There might be also concern about the endogeneity problem of home wages in estimating the conditional labour demand Equation (2). However, the firm-level data is less prone to this problem, because wages are exogenously determined with perfect elastic labour supply (Griliches and Hausman 1986; Hamermesh 1993; Roberts and Skoufias 1997; Slaughter 2001). Both labour supply and demand depend on wages observed. However, when labour supply is perfectly elastic, the position of the labour demand is determined solely by non-labour factor prices and output or product demand shock (Hamermesh 1993).

Both the within-transformation and first-difference estimators of the fixed effect model are employed to eliminate the firms-specific effects and the estimations results are compared between two estimator.[15] The heteroscedasticity-robust standard errors clustering for each firm is used to compute the standard errors. The OLS estimator is also performed to provide a benchmark comparison for results based on the other estimators.

The first-difference estimator provides the better treatment for the endogenity problem, which is common to firm-level data, compared with the within- transformation estimator (Westbrook and Tybout 1993). However, this method may suffer from the potential selectivity bias because it excludes firms not present in both periods t and t-1. It is also known that the first-difference estimator can exacerbate the bias due to measurement errors by reducing the amount of systematic variations in the data (Griliches and Hausman 1986). Therefore, the first-difference and within-transformation estimators are treated as complementary estimation procedures.

Results

Summary statistics and the correlation matrix are presented in Tables 1 and 2 to facilitate the interpretations of the key results. The regression results for the labour demand equation (2) are reported in Table 3. In this table, Equations 1 and 2 report the estimation results based on OLS, and Equations 3 and 4 by within-transformation, Equations 5 and 6 by first-difference, and Equations 7 and 8 by instruments variable (IV) approach. Tables 4a to 4d present results for each of the four regions: East Asia, North America, the EU and South America.

There is some evidence of a positive complementary relationship between overseas operations (*MNE*) and home employment, but the magnitude of the estimated coefficient is very small (Table 3). Model 3 (within-transformation) suggests a 10-percent increase of foreign affiliate employment leads to a 0.18 percent increase of home employment. MNE^{Q} also indicates a statistically significant positive effect on home employment with

the similar magnitude (Model 4). Further, foreign demand shocks, captured by GDP per capita, have no statistical relationship with change in home employment, apart from OLS results.

The first-difference estimator (Models 5 and 6) in Table 3 also suggests a complementary relationship between overseas operations and home employment. However, the magnitude of the estimated coefficients for MNEQ and MNEL is significantly lower than reported for Models (3) and (4). The IV procedure in Models 7 and 8 improves the results for foreign affiliate employment, but the correction of endogeneity for foreign affiliate sales loses the statistical significance of this variable.[15]

The OLS result in Model (1) in Table 3 indicates a positive complementary relationship between foreign affiliates and home employment and the negative impact of foreign affiliate output on home employment. The evidence also indicates a positive impact of foreign market demand shock (*GDPP*) on home employment. However, comparing the estimation results between OLS and the alternative fixed-effect models points to the importance of controlling for the firm-fixed effects. The OLS results that did not account for firm-fixed effects largely overestimate the statistical significance of labour demand variables.

Tables 4a to 4d presents results for each region, East Asia (Table 4a), North America (Table 4b), the EU (Table 4c) and South America (Table 4d). Even though Japanese MNEs have been actively operation in East Asia since the mid-1980s, any expansion in terms of employment and sales do not seem to negatively affect the level of home employment. In fact, foreign operations in East Asia seem to have little impacts on home employment.[16] In North America, foreign affiliates employment and sales have a positive impact (Models 3 and 4, Table 4b). However, the findings are sensitive to the estimation method. The similar inferences can be made for the EU (Table 4c).

Overall, there is no clear-cut evidence of 'exporting jobs' by Japanese MNEs, despite the concerns expressed in the public debates. In fact, there is some weak evidence to suggest that expanded overseas operations may have actually helped to maintain the level of home employment.

Other determinants of labour demand by parent firms can be summarised as follows. Wage elasticity of labour demand consistently has the expected negative sign, indicating a downward sloping of labour demand. The own-wage elasticity is consistently reported in the range of -0.1 to -0.2. The output elasticity is statistically significant both in the within-transformation and the first-difference estimators (Models 3-6). However, this result changes once corrected for the endogeneity problem in Models 7 and 8.

The estimated coefficient of r (the user cost of capital) shows mixed results, making it impossible to infer whether capital and home employment are substitutes for or

complementary to each other. Interestingly, there is a strong effect of R&D intensity of foreign affiliates in East Asian on home employment. The similar results are obtained for North America (Table 4b), but the results are sensitive to the estimation method used. Apart from the industry level regression in Table 4, the sign of *IMP* overwhelmingly shows a positive sign, although it is not statistically significant.

Concluding Remarks

This paper has examined the argument that expansion of overseas operations of Japanese manufacturing MNEs reduces their home employment. A standard labour demand equation of parent firms was estimated based on the newly constructed panel data set, covering information for both home and foreign affiliates' operations. In addition, the geographic location of foreign affiliates was accounted for in order to control for the specific regional characteristics of MNEs.

Despite concerns expressed about the adverse effects of outward FDI on the home economy, the evidence does not support the view that overseas operations expand at the cost of home employment in Japan. On the contrary, the findings provide some weak evidence that overseas operations may have actually helped to maintain the level of home employment in Japanese manufacturing during the period under study.

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Appendices

Table 1 Summary statistics of selected variables used in regression

Symbols of variables	Description	Obs.	Mean Dev.	Std. Var.	Coeff.	Min	Max
L	Log Parent firms employment	8432	6.81	1.36	0.20	3.91	11.32
W	Log Wage rate	8428	-2.84	0.33	-0.12	-5.65	-0.50
Q	Log Output	7837	5.36	1.71	0.32	-1.13	11.21
K	Log Capital price	8419	4.57	0.06	0.01	4.35	4.65
R&D	Log R&D intensity	7179	-3.99	1.31	-0.33	-10.81	-0.46
IMP	Log Import penetration	7853	-3.56	1.03	-0.29	-11.11	-0.66
MNEL	Log Foreign Affiliates Employment	8058	4.90	1.57	0.32	-4.91	10.53
MNEQ	Log Foreign Affiliates Sales	8110	3.19	1.84	0.58	-9.48	10.41
GDPP	Log GDP per capita of host countries	7849	9.22	1.31	0.14	0.71	10.45

Source: Based on the METI database, which is explained in Section 3 and Appendix 1.

Table 2 Correlation Matrix

	w	K	Q	R&D	IMP	MNEL	MNEQ	GDPP
W								
1								
K	-0.06	1						
Q	0.41	-0.01	1					
R&D	0.26	-0.13	0.23	1				
IMP	-0.06	-0.24	0.04	0.08	1			
MNEL	0.16	-0.06	0.49	0.10	0.13	1		
MNEQ	0.32	-0.08	0.71	0.26	0.16	0.66	1	
GDPP	0.16	0.02	0.26	0.20	0.01	-0.06	0.42	1

Source: Based on the METI database, which is explained in Section 3 and Appendix 1.

Table 3 Labour demand by parent firms of MNEs, 1991–2002

	Dependent var.=log (home employment)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS			Within-transformation			1st diff.	1st diff.
-IVS				(WT)				
COEFFICIENT								
Log MNE Employment	0.059***		0.018***		0.006*		0.022*	
	(0.011)		(0.005)		(0.003)		(0.013)	
Log MNE Sales		0.014		0.016***		0.007***		0.003
		(0.011)		(0.004)		(0.003)		(0.008)
Log Wage rate	-0.266***	-0.286***	-0.116***					
				-0.117***	-0.123***	-0.123***	-0.120***	-0.121***
	(0.048)	(0.049)	(0.019)	(0.019)	(0.015)	(0.015)	(0.017)	(0.016)
Log Capital prices	1.040***	1.098***	0.365***	0.375***	0.081	0.087	0.106	0.106
	(0.228)	(0.227)	(0.137)	(0.137)	(0.103)	(0.103)	(0.134)	(0.136)
Log Output	0.669***	0.692***	0.138***	0.136***	0.045***	0.043***	0.062	0.064
	(0.013)	(0.014)	(0.022)	(0.022)	(0.014)	(0.014)	(0.064)	(0.064)
Log R&D intensity	0.151***	0.151***	0.022***	0.022***	0.009***	0.009***	0.009*	0.009*
	(0.013)	(0.013)	(0.005)	(0.005)	(0.003)	(0.003)	(0.005)	(0.005)
Log Import penetration	-0.040***	-0.030**	0.001	0.001	0.007**	0.007**	0.008**	0.008**
	(0.013)	(0.014)	(0.006)	(0.006)	(0.003)	(0.003)	(0.004)	(0.004)
Log GDPP	0.055***	0.034***	0.007	-0.002	-0.001	-0.004	0.001	-0.001
	(0.011)	(0.011)	(0.005)	(0.005)	(0.003)	(0.003)	(0.004)	(0.005)
Constant	-2.513**	-2.548**	4.296***	4.187***	-0.047	-0.055	-0.085*	-0.084*
	(1.053)	(1.048)	(0.662)	(0.654)	(0.046)	(0.045)	(0.051)	(0.050)
Observations	6170	6220	6170	6220	4289	4335	3691	3700
Adjusted R-squared	0.855	0.852	0.296	0.292	0.0917	0.0921	0.0807	0.0876
RMSE	0.496	0.503	0.114	0.114	0.102	0.101	0.102	0.102
# of parent firms	1290	1294	1290	1294	1023	1026	952	953

Note: Time- and industry-dummy variables (three-digit level) are included for all estimations, but the results are suppressed here. Standard errors based on White's heteroscedasticity correction clustered by individual firm are given in brackets, with statistical significance (two-tailed test) denoted as: *** one per cent, ** five per cent, and * 10 per cent. The instruments variables for output, foreign affiliates output and employment used in estimating Models 7 and 8 are discussed in the main text. The over-identifying test statistic for instruments used is 3.69, which does not reject the null hypothesis that all instruments are uncorrelated with the error term at five-per cent significant level ($\chi^2_{q=4}$ =9.49).

Table 4 Labour demand by parent firms of MNEs by region, 1991–2002

(a) - East Asia

	Dependent var.=log (home employment)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS		Within-transformation (WT)			1st diff.	1st diff.-IVS	
COEFFICIENT								
Log MNE Employment	0.007		0.008**		0.002		0.012*	
	(0.008)		(0.004)		(0.002)		(0.006)	
Log MNE Sales		-0.020**		0.006**		0.003		0.002
		(0.009)		(0.003)		(0.002)		(0.005)
Log Wage rate	-0.267***	-0.275***	-0.122***	-0.123***	-0.128***	-0.128***	-0.126***	-0.127***
	(0.049)	(0.049)	(0.021)	(0.021)	(0.017)	(0.017)	(0.020)	(0.020)
Log Capital prices	1.081***	1.050***	0.302**	0.297**	0.042	0.044	0.131	0.123
	(0.247)	(0.244)	(0.147)	(0.147)	(0.100)	(0.100)	(0.146)	(0.145)
Log Output	0.714***	0.727***	0.122***	0.121***	0.037**	0.037**	0.114	0.113
	(0.011)	(0.012)	(0.025)	(0.025)	(0.015)	(0.015)	(0.070)	(0.070)
Log R&D intensity	0.170***	0.167***	0.028***	0.028***	0.011***	0.011***	0.016***	0.016**
	(0.013)	(0.013)	(0.006)	(0.006)	(0.004)	(0.004)	(0.006)	(0.006)
Log Import penetration	-0.032**	-0.027*	-0.000	0.000	0.002	0.002	0.005	0.005
	(0.015)	(0.015)	(0.006)	(0.006)	(0.003)	(0.003)	(0.004)	(0.004)
Log GDPP	-0.027***	-0.007	-0.004	-0.006	-0.001	-0.002	-0.004	0.000
	(0.009)	(0.011)	(0.004)	(0.005)	(0.003)	(0.003)	(0.005)	(0.005)
Constant	-1.902	-1.943*	5.594***	5.633***	-0.004	-0.005	-0.012	-0.020*
	(1.161)	(1.153)	(0.731)	(0.731)	(0.009)	(0.010)	(0.009)	(0.010)
Observations	4947	4986	4947	4986	3426	3464	2898	2907
Adjusted R-squared	0.874	0.875	0.324	0.320	0.0986	0.100	0.0730	0.0775
RMSE	0.475	0.475	0.109	0.109	0.0994	0.0991	0.102	0.101
# of parent firms	1058	1061	1058	1061	829	834	767	768

Note: Time-and industry-dummy variables (three-digit level) are included for all estimations, but the results are suppressed here. Standard errors based on White's heteroscedasticity correction clustered by individual firm are given in brackets, with statistical significance (two-tailed test) denoted as: *** one per cent, ** five per cent, and * 10 per cent. The instrumental variables for output, foreign affiliates output and employment used in estimating Model 4 are discussed in the main text.

Table 4 (continued) Labour demand by parent firms of MNEs by region, 1991–2002

(b) - North America

Dependent var.=log (home employment)

COEFFICIENT	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS		Within-transformation (WT)			1st diff.	1st diff.-IVS	
Log MNE Employment	0.068***		0.014*		0.005		-0.003	
	(0.012)		(0.008)		(0.005)		(0.023)	
Log MNE Sales		0.031**		0.023***		0.006		0.003
		(0.015)		(0.008)		(0.004)		(0.015)
Log Wage rate	-0.286***	-0.313***	-0.119***	-0.121***	-0.120***	-0.120***	-0.104***	-0.102***
	(0.063)	(0.064)	(0.022)	(0.021)	(0.018)	(0.017)	(0.022)	(0.021)
Log Capital prices	0.486	0.729**	0.185	0.184	0.079	0.075	0.043	0.068
	(0.309)	(0.301)	(0.173)	(0.174)	(0.170)	(0.171)	(0.213)	(0.214)
Log Output	0.664***	0.685***	0.105***	0.101***	0.032**	0.031**	0.049	0.068
	(0.017)	(0.019)	(0.026)	(0.026)	(0.015)	(0.015)	(0.071)	(0.067)
Log R&D intensity	0.154***	0.158***	0.016**	0.015**	0.004	0.004	0.004	0.005
	(0.020)	(0.020)	(0.007)	(0.007)	(0.003)	(0.003)	(0.006)	(0.005)
Log Import penetration	-0.022	-0.015	0.001	0.002	0.002	0.002	0.003	0.004
	(0.017)	(0.018)	(0.007)	(0.007)	(0.004)	(0.004)	(0.005)	(0.005)
Log GDPP	-0.090***	-0.031	-0.018	-0.037**	-0.010	-0.014	-0.000	-0.008
	(0.025)	(0.031)	(0.013)	(0.017)	(0.007)	(0.009)	(0.030)	(0.029)
Constant	1.480	-0.128	5.953***	6.019***	-0.003	-0.004	-0.012	-0.016
	(1.421)	(1.396)	(0.837)	(0.840)	(0.009)	(0.009)	(0.015)	(0.013)
Observations	3996	4049	3996	4049	2785	2840	2198	2203
Adjusted R-squared	0.841	0.837	0.247	0.252	0.0836	0.0816	0.0651	0.0584
RMSE	0.503	0.511	0.108	0.108	0.0943	0.0947	0.0934	0.0937
# of parent firms	812	815	812	815	662	665	589	590

Note: Time- and industry-dummy variables (three-digit level) are included for all estimations, but the results

are suppressed here. Standard errors based on White's heteroscedasticity correction clustered by individual firm are given in brackets, with statistical significance (two-tailed test) denoted as: *** one per cent, ** five per cent, and * 10 per cent.

Table 4 (continued) Labour demand by parent firms of MNEs by region, 1991–2002

(c) – The EU

Dependent var.=log (home employment)

	(1) OLS	(2)	(3) Within-transformation (WT)	(4)	(5) 1st diff.	(6)	(7)	(8)
	1st diff.-IVS							
COEFFICIENT								
Log MNE Employment	0.059***		0.011		0.005		0.031	
	(0.013)		(0.007)		(0.004)		(0.019)	
Log MNE Sales		0.023		0.030**		0.021**		0.006
		(0.023)		(0.015)		(0.009)		(0.028)
Log Wage rate	-0.206***	-0.219***	-0.128***	-0.117***	-0.125***	-0.130***	-0.104***	-0.104***
	(0.062)	(0.064)	(0.027)	(0.027)	(0.022)	(0.022)	(0.023)	(0.023)
Log Capital prices	1.199***	1.428***	0.142	0.238	0.067	0.063	0.068	-0.037
	(0.347)	(0.357)	(0.215)	(0.213)	(0.192)	(0.185)	(0.264)	(0.260)
Log Output	0.672***	0.689***	0.097***	0.100***	0.023	0.014	0.030	-0.002
	(0.018)	(0.026)	(0.033)	(0.032)	(0.021)	(0.020)	(0.087)	(0.087)
Log R&D intensity	0.208***	0.212***	0.012	0.012	0.004	0.007	0.003	0.004
	(0.023)	(0.024)	(0.008)	(0.007)	(0.005)	(0.005)	(0.007)	(0.007)
Log Import penetration	-0.021	-0.019	0.005	0.006	0.006	0.007	0.010	0.012
	(0.020)	(0.022)	(0.008)	(0.008)	(0.005)	(0.005)	(0.007)	(0.007)
Log GDPP	-0.087***	-0.041	-0.018	-0.061**	-0.013*	-0.045***	-0.040*	-0.013
	(0.024)	(0.039)	(0.012)	(0.029)	(0.008)	(0.017)	(0.023)	(0.052)
Constant	-1.358	-2.830*	6.376***	6.279***	0.003	-0.060	0.002	0.002
	(1.613)	(1.654)	(1.117)	(1.099)	(0.012)	(0.065)	(0.008)	(0.009)
Observations	2432	2473	2432	2473	1715	1761	1271	1285
Adjusted R-squared	0.862	0.857	0.277	0.285	0.0814	0.0883	0.0412	0.0660
RMSE	0.466	0.475	0.106	0.106	0.0956	0.0978	0.0946	0.0948
# of parent firms	493	495	493	495	399	400	342	345

Note: Time-and industry-dummy variables (three-digit level) are included for all estimations, but the results are suppressed here. Standard errors based on White's heteroscedasticity correction clustered by individual firm are given in brackets, with statistical significance (two-tailed test) denoted as: *** 1per cent, ** 5 per cent, and * 10 per cent.

Table 4 (continued) Labour demand by parent firms of MNEs by region, 1991–2002

(d) – South America

Dependent var.=log (home employment)

	(1) OLS 1st diff.-IVS	(2)	(3) Within-transformation (WT)	(4)	(5) 1st diff.	(6)	(7)	(8)
COEFFICIENT								
Log MNE Employment	0.040		0.021*		0.010		-0.003	
	(0.032)		(0.013)		(0.008)		(0.030)	
Log MNE Sales		0.060		0.050***		0.010		0.018
		(0.041)		(0.019)		(0.009)		(0.027)
Log Wage rate	-0.470***	-0.488***	-0.241***	-0.244***	-0.252***	-0.253***	-0.174*	-0.177*
	(0.130)	(0.133)	(0.066)	(0.066)	(0.072)	(0.069)	(0.102)	(0.102)
Log Capital prices	0.744	0.739	0.821**	0.764**	0.226	0.223	-0.233	-0.177
	(0.719)	(0.715)	(0.347)	(0.349)	(0.261)	(0.250)	(0.495)	(0.462)
Log Output	0.761***	0.731***	0.223***	0.196***	0.071	0.057	0.191	0.178
	(0.030)	(0.043)	(0.079)	(0.075)	(0.074)	(0.072)	(0.213)	(0.194)
Log R&D intensity	0.157***	0.154***	0.003	0.003	-0.000	-0.001	-0.001	-0.001
	(0.033)	(0.031)	(0.015)	(0.015)	(0.007)	(0.007)	(0.009)	(0.009)
Log Import penetration	-0.015	-0.019	0.039***	0.039***	0.003	0.003	0.012	0.010
	(0.043)	(0.043)	(0.013)	(0.013)	(0.010)	(0.009)	(0.012)	(0.011)
Log GDPP	-0.071	-0.110	-0.001	-0.064*	-0.001	-0.008	0.013	-0.023
	(0.054)	(0.076)	(0.018)	(0.034)	(0.013)	(0.017)	(0.044)	(0.050)
Constant	-1.179	-0.722	2.392	2.820	0.031***	0.031***	0.101	-0.039
	(3.291)	(3.337)	(1.782)	(1.808)	(0.012)	(0.012)	(0.130)	(0.040)
Observations	764	780	764	780	546	563	320	321
Adjusted R-squared	0.882	0.882	0.420	0.426	0.227	0.217	0.267	0.273
RMSE	0.467	0.465	0.108	0.107	0.0923	0.0929	0.0904	0.0899
# of parent firms	154	156	154	156	129	131	96	97

Note: Time- and industry-dummy variables (three-digit level) are included for all estimations, but the results are suppressed here. Standard errors based on White's heteroscedasticity correction clustered by individual firm are given in brackets, with statistical significance (two-tailed test) denoted as: *** one per cent, ** five per cent, and * 10 per cent.

Appendix 2 METI Surveys: Explanatory note

The Basic Survey of Business Structure and Activity

This survey on Japanese firms, first conducted in 1991 has become an annual survey since 1994. It covers all firms in both manufacturing and non-manufacturing including mining, wholesale, agriculture, retail, and construction as well as the service sector that have both more than 50 employees and capital of more than 30 million yen. It collects sufficient information to quantify details on the domestic operations of Japanese firms, including total sales, total purchases, employment, workers' compensation, fixed tangible and non-tangible assets, capital, number of establishments, R&D expenditure, year of establishment, exports, and imports. Most key variables have been reported continuously since 1991 except for the years in 1992 and 1993. Transactions are recorded in millions of Japanese yen and measure the amounts paid or received by individual firms. All individual firms are assigned unique identifiers, making it possible to track operations of the same firms over time. The survey is mandatory by Japanese law and hence the response ratio is very high (around 90 per cent).

The capital stock is measured by the book value of the stock of tangible assets, such as capital, machinery and property. The nominal capital stock is transformed into the real term using the wholesale prices index of machinery and equipment as a deflator. This deflator is obtained from the Bank of Japan. In the original METI Firm survey, there are no readily available data for the intermediate input expenditures. Hence, they are defined as the sum of the cost of goods sold and general administrative costs minus wage bills, the rate of depreciation as well as the rental costs.

The Basic Survey of Overseas Japanese Business Activity

This survey covers economic activities of foreign affiliates operating overseas. The survey are sent out to their parents firms located in Japan. There has been a relatively long history of conducting this survey commencing in 1971, a detailed survey every three years since 1981 and a standard one each year in other years. However, data are available by electronics means for this project only from 1989. Most importantly, each individual foreign affiliate is assigned its own unique code as well as the parent firm identifier.

The Basic Survey of Overseas Japanese Business Activity contains the main vari-

ables such as sales output distinguished by destinations such as local market, Japan or other countries, total purchase distinguished by sources, wages and salaries, employment, fixed tangible assets, capital, and R&D spending. However, not all have been reported consistently since 1989. For instance, wage and salaries only appear continuously from 1994, and fixed tangible assets are only available for years 1989, 1992, 1995, 1998, and 2001. This survey also reports limited information about the operations of parent firms, such as sales, purchases, employment, and capital.

While the survey has been a very useful and valuable data source for evaluating the overseas operations of Japanese MNEs, its quality has been questioned from time to time (Ramstetter 1996). These problems can be summarised as follows. Unlike the METI Firm survey, responding to this survey is not a mandatory requirement. This yields a wide fluctuation in sample coverage from year to year. The response rate varied from 33 per cent in 1980 to 51 per cent during 1983-1992, but has increased somewhat in more recent years. In 2005, the questionnaire was sent to 4,564 Japanese firms, and 3,176 completed and the corresponding return rate accounts for 69.6 per cent. Information on foreign affiliates operating in developing host countries is far less satisfactory than from those operating in developed host countries.

There is also a wide variation in the reported coverage of variables from year to year, making it difficult to track the same variable over time (Matsuura 2004). However, the key variables, including sales, employment, and the year when foreign affiliates were established are available for each year. Other items, such as intermediate inputs expenditure and capital stock have not been reported on a consistent basis. In addition, the fluctuation in the survey response rate also significantly influences the stability of variables over time (Matsuura 2004). Some key variables, such as sales and employment, are found to follow a smooth time-series pattern, while variables such as workers compensation and R&D expenditure behave less consistently over time.

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supportive and hospitable environment.

Notes

1 Fortunately, Japan is one of the few countries, besides the United States and Sweden, where detailed information on the overseas operations of national firms has been collected systematically over a long period of time (Lipsey 2003). Recently, these firm-level surveys containing direct measures of Japanese MNEs' performance have become increasingly available to researchers (Kimura and Ando 2003, 2005; Ando and Kimura 2005; Hijzen et al. 2008; Kimura and Kiyota 2006; Shimizutani and Todo 2007; Todo and Shimizutani 2008). However, none of them has explored the issue of exporting jobs covered in our paper.

2 Head and Ries (2001) use the firm-level data compiled from the Toyo Keizai which only includes the listed firms in the stock market in Japan.

3 Complex integration forms another type of MNE (UNCTAD 1998, 2002; Yeaple 2003). This type shares certain features of both the vertical and horizontal types. Any MNE might set up integrated production to serve a foreign country market, and might also choose to operate in another host foreign country for the purpose of assembly. They establish foreign affiliates to save on transportation costs, and also establish affiliates in other foreign countries in order to benefit from international factor price differentials. As a result, the net impact of all of these overseas operations depends on the extent and magnitude between the vertical and horizontal type of operations (is this needed?).

4 The BEA data is a comprehensive and integrated data-set for tracking the operations of US MNEs non-bank foreign affiliates in host countries and the operation of parent firms in their home countries. The survey began in 1929, but its scope was initially limited to one question – the value of foreign commercial assets controlled by US companies (see Mataloni (1995) for more details).

5 Of the available studies on Japanese MNEs, a disproportionately large number of studies have focussed on the relationship between overseas production and Japan's exports (Fukao and Amano 1998; Lipsey et al. 1999; Head and Ries 2001; Kimura and Kiyota 2006).

6 During work on this data-set, we have extensively referred to Matsuura and Kiyota (2004) and the resources available from the RIETI website at: http://www.rieti.go.jp/jp/database/d02.html#01.

7 In principle, it would be possible to include variables for each host country where foreign affiliates potentially operate without aggregating foreign affiliate variables. However, this creates the problem of repeating the same information for the corresponding parent firms, making it difficult to interpret the estimated results (Brainard and Riker 1997).

8 In the experimental stage, an alternative weighting scheme was attempted using the employment share, but results were similar. Therefore, the results reported below are based on the sales share of foreign affiliates.

9 GDP per capita is taken from the World Bank Development Indicators.

10 The METI Firm Survey only collects information on the number of workers, not on hours worked. While fluctuations in hours per worker are crucial for understanding short-run labour demand, in the long run variation the number of workers is the primary adjustment method (Hamermesh 1993; Roberts and Skoufias 1997). Therefore, a focus on employment, rather than hours worked, is consistent with the objective of explaining long-run labour demand differences at the firm-level.

11 http://www.boj.or.jp/type/stat/dlong/price/cgpi/index.htm

12 They are available for the following industries, textile products, iron and steel, non-ferrous metals, metal products, general machinery, electrical machinery, transport equipment, precision instruments, and other manufacturing industry products.

13 http://devdata.worldbank.org/dataonline/

14 The within-transformation estimator performs OLS on variables expressed in terms of deviations from the firm-specific means: for any variable xit, the within transformed variable can be written as follow, $\bar{x}_{i,t} = x_{i,t} - (T)^{-1} \sum_{t=1}^{T} x_{i,t}$ i=1,….N, where i and t represent individual firm and time, respectively. The difference estimator applies OLS on time-differentiated data: $\Delta x_{i,t} = x_{i,t} - x_{i,t-j}$ t=1,..j…T.

15 The over-identifying test statistic for instruments amount to 3.69, which does not reject the null hypothesis that all instruments are uncorrelated with the error term at 5-percent significant level ($\chi^2_{q=4}$ =9.49). In other words, the selected instruments are valid instruments with no direct correlation with the error term in equation (2). The first stage regression also finds a strong correlation between the selected instruments and the endogenous variables (the results are suppressed for brevity).

16 However, the increased international production in East Asian countries have changed the skill composition of home employment in Japanese manufacturing (Head and Ries 2002; Yamashita 2007; Ahn et al. 2008).

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