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Expansion abroad and jobs at home: Evidence from Japanese multinational enterprises☆

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ABSTRACT

This paper examines the so-called 'exporting job' hypothesis – that expansion of overseas operations of manufacturing multinational enterprises (MNEs) reduces home employment – using a newly constructed matched parent-affiliate panel dataset of Japanese MNEs over the period 1991–2002. The results do not support the widely held view that overseas operations of MNEs lower home employment. On the contrary, there is some evidence that expansion of overseas operations may have helped to maintain the level of home employment.

1. Introduction

The debate over the possible adverse effects of overseas production by multinational enterprises (MNEs) on home employment ('exporting jobs') first emerged in the US in the late-1960s (Kravis and Lipsey, 1988). It has gained increased attention in policy circles of industrial countries in recent year with the growing importance of international fragmentation of production (Lipsey, 1995; Harrison and McMillan, 2006). It had also become 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.

Given its policy importance, there has been a proliferation of empirical investigations of the exporting jobs hypothesis, using matched parent-affiliates datasets for MNEs of various national: Brainard and Riker (1997), Hanson et al. (2003) and Desai et al. (2009), for the US MNEs, Braconier 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 our best 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 available industry-level FDI data (Fukao, 1995; Fukao and Amano, 1998; Fukao and Yuan, 2001). Since the FDI decision is made at the firm-level rather than the industry-level, the firm-level dataset allows us to undertake the first analysis for properly assessing the exporting jobs hypothesis for Japanese MNEs. Head and Ries (2002) uses the firm-level data compiled from the Toyo Keizai which only includes the listed firms in the Japanese stock market in Japan. Instead, the dataset compiled for our paper cover divers scale of Japanese parent firms.

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This paper uses a newly constructed firm-level matched parent-affiliates panel dataset 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 their high quality and reliability (Nishimura et al., 2005; Kimura and Kiyota, 2006; Hijzen et al., 2010). The analysis of this paper is based on estimating labour demand of parent firms controlling for the firm attributes and specific regional characteristics of overseas operation of MNEs.

The findings of this paper do not support the 'exporting job hypothesis'. Instead, there is some evidence of complementary relationship between employment in foreign affiliates of MNEs and their home employment; a 10 percent increase of foreign affiliate employment leads to a 0.2 percent 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 initiative driven by the public fear of exporting jobs could have 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 MNEs' home economic activity. Sections 4–6 introduce the econometric specification, the description of the data and the estimation method, followed by interpretation on the results in Section 7. Section 8 concludes.

2. The effect of the overseas operations on domestic operations of MNEs

There is no definitive theory of 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 allocations 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. In general, the theory postulates two types of MNEs, depending on the investment motivation: *vertical* or *horizontal*. The former type of MNEs vertically separate 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. 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.

Fukao (1995) makes an early attempt to examine the possible impacts of foreign affiliate production on domestic employment for Japan. Fukao and Yuan (2001) develop a three-digit level of cross-industry data, concerning the impact of FDI on the employment growth rate over the period 1989–1998. 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. Our paper makes an important extension of these studies by examining the exporting jobs hypothesis, using newly developed parent-affiliates panel dataset. The previous studies primarily use readily available FDI data at industry-level. There is virtually no direct evidence of how Japanese MNEs adjust home employment in response to changes in production capacity of foreign affiliates. This is certainly an area where studies on Japanese MNEs lag behind those of US and Sweden-based MNEs.[2] Firm-level analysis is more appropriate because FDI decision is determined at firm-level rather than industry-level. The only exception is Head and Ries (2002) that use firm-level data for Japanese MNEs from Toyo

Table 1
Pattern of home and overseas employment of Japanese MNEs .

Year	Home employment in 1000	Overseas employment in 1000	Overseas employment ratio
1991	2245	1261	0.56
1994	2275	1972	0.87
1995	2267	1986	0.88
1996	2328	2258	0.97
1997	2292	2540	1.11
1998	2188	2339	1.07
1999	2261	2812	1.24
2000	2215	3049	1.38
2001	2121	2645	1.25
2002	2066	2844	1.38
Average	2225.8	2370.6	1.07

Source: Based on the METI database, which is explained in Appendix A.

[1] Fortunately, Japan is one of the few countries, besides the US 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 Kiyota, 2006; Todo and Shimizutani, 2008; Hijzen et al., 2010). However, none of them has explored the issue of our paper.

[2] 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; Harrison and McMillan, 2006; Desai et al., 2009). These studies make use of firm-level survey data from the Bureau of Economic Analysis (BEA), the US Department of Commerce. Despite using the same dataset, the evidence is, at best, mixed. Studies on MNEs for other countries are also contradictory. Muendler and Becker (2006) found that jobs growth in foreign affiliates adversely affect employment in Germany MNEs parents. While Braconier and Ekholm (2000) uncovered a mild substitution between home and foreign employment in developed countries for Swedish MNEs, Navaretti and Casellani (2004) found no impacts of FDI on employment of Italian MNEs parents.

Table 2
Annual growth rate of home and overseas employment, 1991–2002.

	Home employment, annual growth rate				Overseas employment, annual growth rate			
	1991–1996	1996–1999	1999–2002	1991–2002	1991–1996	1996–1999	1999–2002	1991–2002
Food products and beverages	6.1	−2.5	0.8	10.9	6.4	2.6	25.0	15.8
Textiles	5.3	2.0	−6.1	3.3	9.6	1.4	4.6	8.6
Cloth	6.3	4.8	−2.8	10.4	8.8	8.7	8.6	3.8
Chemicals	0.8	−1.4	1.0	0.8	3.2	−1.4	5.5	4.3
Oil refined products	7.8	3.0	−24.1	1.9	12.4	−10.5	−16.6	3.3
Clay products and cements	−4.4	−6.9	−10.9	−7.5	−5.4	−7.6	−4.0	−7.7
Steel manufacturing	−4.3	−4.3	−1.7	−2.8	9.5	28.9	−2.1	6.0
Non-ferrous metals	−1.6	3.6	−5.6	1.3	0.7	1.5	3.1	3.8
General machinery	0.1	1.6	−4.5	0.1	1.3	4.1	2.9	3.8
Electronic machinery	−0.9	−1.1	−4.0	−1.8	2.5	6.6	6.5	5.8
Transport equipment	−0.5	0.1	−1.3	−0.5	3.7	4.7	10.3	6.8
Precision machinery	−2.0	7.7	0.3	−0.2	35.2	17.4	19.5	22.4
Other manufacturing	2.7	−1.6	−2.5	1.7	5.8	6.9	12.4	8.8

Source: Based on the METI database, which is explained in Appendix A.

Keizai. However, their study has a limited scope since their data only covers for the listed Japanese firms. In this respect, the dataset used in our paper covers a wide range of Japanese parent firms.

3. Pattern of home and overseas operations

Before performing econometric analysis, it is useful to briefly review employment pattern of home and overseas operations of Japanese MNEs.[3] Table 1 provides an overview of employment pattern based on matched parent-affiliate dataset for the period 1991–2002 (Appendix A offers the detailed explanation on the dataset). In 2002 overseas employment has reached over 2.8 million, up from 1.2 million in 1991. [4] On the other hand, home employment has been growing very slowly. Home employment declined to 2.0 million in 2002 from 2.2 million in 1991. Time trend suggests that home employment has continuously been declining from 2.3 million at peak in 1996.

Table 2 looks at annual growth rate of home and overseas employment at industry-level. Possible substitution between home and overseas employment can be inferred from Table 2. For example, parent firms of high-tech industries such as electronic, transport equipment and precision machinery experienced slow employment growth during the period of 1991–2002, whereas overseas employment of these sectors increased rapidly in this period. Among them overseas employment of precision machinery grew at 22.4 percent annual rate for 1991–2002, while home employment of this industry has had negative growth in this period. The following section formally examines this in a regression format.

4. The empirical formulation

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'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 (i.e., 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 'exporting job' hypothesis suggests the negative coefficient on MNE. On the other hand, the positive coefficient indicates 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-maximizing 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

[3] See Yamashita (2010) for detailed discussion of development of home and overseas operation of Japanese MNEs.

[4] *Overseas employment* refers to the number of workers hired by foreign affiliates of Japanese MNEs overseas. *Home employment* is the number of workers employed by parent firms of Japanese MNEs in Japan.

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 aging of capital equipment, the extent of unionization, 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.[5]

Another factor influencing labour demand is the force of international competition. Tomiura (2004) and Bernard et al. (2006) 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 Yamashita (2008), 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:

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

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 parenthesis:

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 −)
GDPP	Host-country GDP per capita (+)
f	Firm-specific fixed-effect
γ	Time-specific fixed-effect
ε	Random error term representing other omitted influences.

5. Variable construction

We use two different measures of *MNE*: employment and output of foreign affiliates (MNE^L and MNE^Q). 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^L and MNE^Q (a subscript t is suppressed for brevity):

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

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

[5] In our dataset, industry classification of parent firms changes over time as firms switch industry. To capture this, regressions include industry-specific dummy variables. However, the main results are resilient to exclusion of industry dummy variables.

The weight (wgt) is the share of foreign affiliate j in the wourldwide (aggregate) foreign affiliate sales of the corresponding parent firm i.[6] GDP per capita of host-country is computed in a similar fashion.[7]

5.1. Other variables

The dependant variable (L) is measured by the average number of regular employees.[8] 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.[9] The home wage rate (w) 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 database of the Bank of Japan.[10]

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 three-digit industry-level.

6. Estimation method

The most important estimation issue is the possible endogeneity of some explanatory variables in Eq. (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., 2009). 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

[6] 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.

[7] GDP per capita is taken from the World Bank Development Indicators.

[8] 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). 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.

[9] http://www.boj.or.jp/type/stat/dlong/price/cgpi/index.htm.

[10] 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.

Table 3
Summary statistics of selected variables used in regression.

Symbols of variables	Description	Obs.	Mean	Std. dev.	Coeff. var.	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
MNE^L	Log foreign affiliates employment	8058	4.90	1.57	0.32	−4.91	10.53
MNE^Q	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

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.[11]

There is also concern about possible correlation between the output variable (*Q*) of parent firm and the error term in Eq. (2). The use of time-dummies, industry- and firm-specific fixed-effects to some extent alleviates the potential endogeneity problem. 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.

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). 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 firm-specific effects and the estimations results are compared between two estimator.[12] 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. 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. Therefore, the first-difference and within-transformation estimators are treated as complementary estimation procedures.

Table 4
Correlation matrix.

	w	*K*	*Q*	*R&D*	*IMP*	MNE^L	MNE^Q	*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			
MNE^L	0.16	−0.06	0.49	0.10	0.13	1		
MNE^Q	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 Appendix A.

7. Results

Summary statistics and the correlation matrix are presented in Tables 3 and 4 to facilitate the interpretations of the key results. The regression results for the labour demand equation (2) are reported in Table 5. In this table, Eqs. (1) and (2) report the estimation results based on OLS, and Eqs. (3) and (4) by within-transformation, Eqs. (5) and (6) by first-difference, and Eqs. (7) and (8) by instruments variable (IV) approach. Tables 6a–6d 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 5). 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 5 also suggests a complementary relationship between overseas operations and home employment. However, the magnitude of the estimated coefficients for MNE^Q and MNE^L 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.[13]

The OLS result in Model (1) in Table 5 indicates a positive complementary relationship between foreign affiliates and home

[11] http://devdata.worldbank.org/dataonline/.

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

[13] The overidentifying 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 Eq. (2). The first stage regression also finds a strong correlation between the selected instruments and the endogenous variables (the results are suppressed for brevity).

Table 5
Labour demand by parent firms of MNEs, 1991–2002.

	Dependent var. = log (home employment)							
	OLS		Within-transformation (WT)		1st diff.		1st diff. -IVS	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
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 heteroscadasticity correction clustered by individual firm are given in parentheses, with statistical significance (two-tailed test) denoted as: ***1 percent, **5 percent, and *10 percent. The instruments variables for output, foreign affiliates output and employment used in estimating Models (7) and (8) are discussed in the main text. The overidentifying 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 5-percent significant level ($\chi^2_{q=4} = 9.49$).

Table 6a
Labour demand by parent firms of MNEs, 1991–2002 (a)—East Asia.

	Dependent var. = log (home employment)							
	OLS		Within-transformation (WT)		1st diff.		1st diff.-IVS	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
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 heteroscadasticity correction clustered by individual firm are given in parentheses, with statistical significance (two-tailed test) denoted as: ***1 percent, **5 percent, and *10 percent. The instrumental variables for output, foreign affiliates output and employment used in estimating Model (4) are discussed in the main text.

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 6a–6d present results for each region, East Asia (Table 6a), North America (Table 6b), the EU (Table 6c) and South America (Table 6d). Even though Japanese MNEs have been actively operation in East Asia since the mid-1980s, its expansion

Table 6b
Labour demand by parent firms of MNEs, 1991–2002 (b)—North America.

	Dependent var. = log (home employment)							
	OLS		Within-transformation (WT)		1st diff.		1st diff.-IVS	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Coefficient								
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 heteroscadasticity correction clustered by individual firm are given in parentheses, with statistical significance (two-tailed test) denoted as: ***1 percent, **5 percent, and *10 percent.

Table 6c
Labour demand by parent firms of MNEs, 1991–2002 (c)—the EU.

	Dependent var. = log (home employment)							
	OLS		Within-transformation (WT)		1st diff.		1st diff.-IVS	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
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 heteroscadasticity correction clustered by individual firm are given in parentheses, with statistical significance (two-tailed test) denoted as: ***1 percent, **5 percent, and *10 percent.

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.[14] In North America, foreign affiliates employment and sales have a positive impact (Model (3) and (4), Table 6b). However, the findings are sensitive to the estimation method. The similar inferences can be made for the EU (Table 6c).

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

[14] However, the increased international production in East Asian countries has changed the skill composition of home employment in Japanese manufacturing (Head and Ries, 2002; Yamashita, 2008).

Table 6d
Labour demand by parent firms of MNEs, 1991–2002 (d)—South America.

	Dependent var. = log (home employment)							
	OLS		Within-transformation (WT)		1st diff.		1st diff.-IVS	
	(1)	(2)	(3)	(4)	(5)	(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 heteroscadasticity correction clustered by individual firm are given in parentheses, with statistical significance (two-tailed test) denoted as: ***1 percent, **5 percent, and *10 percent.

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 6b), but the results are sensitive to the estimation method used.

8. Concluding remarks

This paper has examined the hypothesis 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 a newly constructed panel dataset that has information on both home and foreign affiliates' operations. In addition, the study took account of the geographic locations of foreign affiliates to control for specific regional characteristics of MNEs.

Despite widely held concerns about the adverse effects of outward FDI on the home employment, the results do not provide any evidence that outward FDI reduces employment at home. On the contrary, the findings provide some weak evidence that during the study period overseas operations may have actually helped to maintain the level of home employment in Japanese manufacturing. Overall, the evidence suggests that expanded overseas operations by MNEs not only help firms to enhance their competitiveness and profitability but may also have a positive impact on home MNE employment by generating higher demand for more technology and skill intensive activities where the Japanese home base is likely to have a comparative cost advantage.

This finding challenges the popular perception of MNEs 'exporting jobs' when they expand overseas operations. Indeed, when the positive general equilibrium effects of profit remittances on overall home employment is also taken into account, there appears to be no case for any government action to restrain overseas expansion of Japanese MNEs. Eventually this process will help upgrade the skill intensity of the home production. However, there will be a transitional period during which there is likely to be significant adjustment pressures on the MNE workforce at home as MNE home production is restructured to focus on production of more technology and capital intensive production process. It is important that research is undertaken to investigate the firm-level effects of this process to identify the adjustment problems faced by the existing MNE workforce and to address related assistance and labour retraining requirements.

Appendix A. Construction of the panel data

The panel dataset used in this study was compiled from the Basic Survey of Business Structure and Activity (*Kigyo Katsudou Kihou Chosa*) (information on parent firms) the Basic Survey of Overseas Japanese Business Activity (*Kaigai Gigyou Katsudou Kihon Chosa*) (information on the corresponding foreign affiliates). Both surveys are conducted by the Ministry of Economy, Trade and Industry (METI). For brevity, the former will henceforth be called the 'METI Firm survey' and the latter the 'METI Foreign Affiliates survey'. The dataset cover 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 dataset includes parent firms that have both more than 50 employees and capital of more than 30 million yen. The data are at the three-digit level of Japan Standard Industrial classification (JSIC).

Creating a matched panel dataset 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 three-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 5 for the construction of foreign affiliate variables).[15] This was essential to make the panel data estimation operational, because Japanese parent firms often own several foreign affiliate operating in multiple locations. For instance, Toyota has foreign affiliates in Thailand, the US, UK and many other countries.

Lastly, about 1 percent of the data was excluded from the original dataset as outliers which are 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 dataset covers foreign-owned enterprises operating in Japan as well. However, in Japanese manufacturing the presence of foreign-owned enterprises is very low due to low level of inward FDI. For instance, Kiyota and Matsuura (2006) found that foreign-owned firms only represented around 1 percent in Japanese manufacturing in the sample of METI survey during the period of 1995–2002. In our dataset, only around 1 percent of parent firms are also those of foreign-owned. As expected, the estimation results by dropping those foreign-owned firms do not change at all.

Appendix Table 1 summarises key indicators of parent firms of Japanese MNEs based on the matched parent-affiliate dataset. Parent firms of MNEs in total manufacturing accounted for an average of about 6.6 percent over the period 1991–2002. While this seems small, but these parent firms of MNEs contributed the majority of economic activity to total manufacturing over 1991–2002. In 2002, parent firms of MNEs accounted for close to 55 percent of aggregate manufacturing outputs and over 40 percent of aggregate manufacturing employment as well as more than half of aggregate capital stock. Almost half of manufacturing workers' compensation was also paid by MNEs. Not surprisingly, parent firms conducted the major proportion of international trade, accounting for over 80 and 60 percent of exports and imports, respectively, and contributed over a 75 percent share of

[15] 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).

Table A1
Selected indicators of parents firms of Japanese manufacturing MNEs, 1991–2002.

Year	Number of MNE parent firms (unit)	Sales of MNE parent firms (trillion of yen)	Employment of MNE parent firms in 1000	Share in total Japanese manufacturing of:						
				Number of MNEs (percent)	Output of MNEs (percent)	Employment of MNEs (percent)	Workers earnings of MNEs (percent)	Capital stock of MNEs (percent)	Exports of MNEs (percent)	Imports of MNEs (percent)	R&D of MNEs (percent)
1991	616	128.8	2245	4.5	48.2	37.2	43.9	47.1	–	–	73.5
1994	863	124.2	2275	6.3	49.6	38.3	45.2	49.3	86.2	60.6	74.6
1995	782	128.5	2267	5.4	49.0	38.0	44.6	48.7	80.8	60.7	75.7
1996	902	143.2	2328	6.3	51.7	39.4	46.5	50.5	82.5	58.5	77.2
1997	950	142.7	2292	6.7	52.8	40.1	47.6	51.9	82.5	60.3	77.8
1998	914	131.4	2188	6.5	52.0	39.2	46.7	50.4	82.8	60.9	77.8
1999	989	138.6	2261	7.1	54.4	41.1	48.6	52.4	84.8	62.2	79.0
2000	926	144.8	2215	7.6	57.2	44.0	51.9	55.7	86.5	69.1	81.2
2001	984	139.3	2121	7.3	55.8	41.4	49.5	53.5	83.2	65.0	78.4
2002	1144	136.8	2066	8.7	54.6	42.1	50.8	52.9	86.1	64.8	80.6
Average	907.0	135.8	2225.8	6.6	52.5	40.1	47.5	51.2	83.9	62.5	77.6

Source: Based on the compiled METI database.

the research and development (R&D) expenditure in total manufacturing over the same period. These figures suggest that any effects on the operations of MNEs are likely to be deeply felt in the home economy.

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.

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