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Working Paper Series Vol. 2005-31
December 2005

The International Centre for the Study of East Asian Development, Kitakyushu

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Keywords*: R&D, multinational firms, Foreign Direct Investment*
JEL codes: *F23, O32*

ABSTRACT

We develop a model of the allocation over countries of gross fixed capital formation by multinational firms. We test the predictions of the model on survey data for Japanese multinational firms in 1996, using fixed capital investment data contained in the Survey of Trends in Business Activities of Foreign Affiliates conducted by the Ministry of Economy, Trade and Industry (METI). Examining 605 fixed capital investment decisions at the firm and country level, we find that investment rates are positively affected by the firms' global return on assets, while higher wages relative to wage levels in other countries reduce investment rates. Relative country risk similarly reduce investment rates, while relative output growth at the industry and country level has a positive impact only on investments in Asia. The sensitivity of investment rates to the country's relative performance in terms of output growth, wages, and risk is found to be substantially greater for Asia than for other countries.

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* The authors would like to thank Gyoku Kou Gi for research assistance and the Research Institute for Economy, Trade and Industry (RIETI) for allowing access to the data. René Belderbos gratefully acknowledges financial support from the International Centre for the Study of East Asian Development (ICSEAD) and the Japan Society for the Promotion of Science (JSPS).

Fixed Capital Investments by Multinational Firms

1. Introduction

With the increasing interest among academics, policy makers, and the general public in the perceived trend towards 'globalization' in the world economy, the impact of multinational firms on national economies has received considerable renewed attention. Japan in particular has witnessed a strong growth in the overseas activities of its multinational firms in the last two decades, which, combined with the lacklustre performance of the Japanese economy, has fuelled a discussion of a potential 'hollowing out' of the economy through outward foreign direct investment (FDI). Economic research has paid substantial attention to the economic impact of FDI and the behaviour of multinational firms in general. There is a large body of academic literature on the economic impact of multinational firms focusing on the effects of inward foreign direct investment on host economies, in particular in developing countries (e.g. Aitkin and Harrison 1997, Belderbos et al. 2001, Borensztein et al 1998). Most studies have found a beneficial effect of foreign firm activities on host country wages and productivity, provided that the firms are sufficiently embedded in the host economy and that the host country possesses a sufficient level of 'absorptive capacity' (i.e. a sufficient level of education of its workers) to utilize know how and more productive technologies introduced by the multinational firms (c.f. Blomström and Kokko 1998). Research into the effects of FDI on the home economies of the multinational firms has generally been more limited. A major focus of research has been the question whether manufacturing FDI is a substitute for, or a complement of, exports from the home country. Results have painted a mixed picture with complementary and substitutable relationships found alternately (e.g. Blomström et al. 1988, Lipsey and Wise 1984, Fukao 1995b, Belderbos and Sleuwaegen 1998, Head and Ries 2001). The conclusion from this literature is that the nature of the relationship depends crucially on the demand enhancing impact of FDI in foreign markets as well as the motivation for FDI: to access foreign markets ('horizontal' FDI) or to reduce cost ('vertical' FDI). In the former case, substitution tends to occur while in latter case, increased intermediate goods exports from the home country tends to lead to complementary effects (e.g. Head and Ries 2001). A related recent

direction of research has focused on the impact of FDI on domestic wages and domestic employment for different types of jobs, c.f. unskilled versus skilled labor (e.g. Slaughter 2000, Feenstra and Hanson 1996, Brainard and Riker 1997, Blomström et al. 1997, Head and Ries 2002, Ito and Fukao, 2003). Here empirical results have also appeared to provide mixed evidence, which has similarly been attributed to the inability of studies to take into account the heterogeneity in the roles of different types of FDI (Hanson et al. 2001).[1]

Given the strong recent interest in the home and host country effects of multinational firms, it is surprising that virtually no attention has been paid to the more basic underlying question of the relationship between fixed capital investments in different countries. This potential interaction between multinational firms' investment behaviour in different countries in is itself the driver of potential employment substitutability and wage effects of FDI. Lack of data has prevented research in this area, which has been limited to a few early studies. Belderbos (1992) found substitution between FDI stocks and domestic assets for Dutch multinational firms but had to rely on aggregated balance sheet data. Stevens and Lipsey (1992) examined the interaction between foreign and domestic fixed capital investments using panel data on an extremely small sample of 7 US multinationals firms. They found evidence of a negative impact of foreign fixed capital investment on domestic investments through interaction in financing decisions: given financing constraints and an upward sloping capital cost function, projects abroad reduce investments in marginal projects domestically. They found less robust evidence of a more direct substitution between foreign and domestic capital investment on the production side (direct competition between locations for investment projects). Harrison and McMillan (2003) examined panel data on fixed capital investments by foreign affiliates as well as domestic firms in Ivory Coast, but did not study the interaction with investments in other countries. Their study is concerned with possible crowding out of domestic firms by foreign firms on the local credit market, for which they find evidence in the case of Ivory Coast. The results may be due to the particular banking structure and practices in the country.

[1] A related emerging literature has studied the impact on domestic R&D and manufacturing productivity of multinational firms' technology sourcing overseas through overseas R&D activities, which have suggested a positive impact conditional on the location and orientation of overseas laboratories (Iwasa and Odagiri, 2003; Griffith, Harrison, and van Reenen, 2003, Fors, 1996).

Other related studies have focused on the determinants of FDI or the location decisions for given foreign investment projects (the choice between countries or the choice between provinces within countries). These studies have confirmed that the size of foreign markets, foreign labor cost, and possible benefits due to agglomeration of foreign investments in specific locations, play a significant role in attracting inward investments (e.g. Belderbos and Sleuwaegen 1996, Belderbos and Carree 2002, Fukao et al. 1996, Head et al. 1995). While these studies suggest substitutability between locations for a given investment project, they have not examined substitutability or complementarity in overall fixed capital investments at the broader firm level, which may arise through finance constraints and through substitution or complementarities between investment projects (e.g. investment in an assembly plant abroad may be complementary to a related investment in an intermediate good plant at home). The interactions between investments in different locations can only be uncovered through a systematic study of fixed capital investments by firms at the global level.

This paper partly addresses the observed gaps in current academic research by investigating empirically the interaction between fixed capital investments in foreign countries by Japanese multinational firms at the detailed micro-level. In this paper, we therefore focus on the allocation of investment over different foreign locations, rather than the interaction between domestic and foreign investments. This perspective is most interesting for foreign countries, in particular developing countries, aiming to attract multinational firms' investments. Our study is the first to analyse foreign fixed capital investments for a large sample of multinational firms. We develop a model of the allocation over countries of gross fixed capital formation by multinational firms. We test the predictions of the model on survey data for Japanese multinational firms in 1996, drawing on fixed capital investment data contained in the Survey of Trends in Business Activities of Foreign Affiliates conducted by the Ministry of Economy, Trade and Industry (METI).

2. A Model of Fixed Capital Investments

We develop a two period model of fixed capital investments by a multinational firm that produces identical product in *n* countries. We examine the multinational firm's fixed capital investment decision from period 0 to period 1. In order to keep the analysis tractable we abstract from trade costs or trade barriers. Under this assumption, all the affiliates and the parent firm face an identical shadow price of output, *p*. Let the firm's production function in each country take the form of a Cobb-Douglas function:

(1) $Q = \Omega^{\gamma} K^{\beta} L^{1-\beta}$

Production by the firm is augmented through Marshallian agglomeration externalities such that the productivity of the firm is an increasing function of total production Ω of the industry in the host country. We assume $0<\beta<1$ and $0<\gamma<1$. The firm chooses optimal labor input in country *j*, L_j to maximize its current profit, $PQ–wL$. The firm's optimal labor input in period 1 is then given by:

(2) $L = \left(\frac{(1-\beta) p \Omega^{\gamma}}{w} \right)^{\frac{1}{\beta}} K$

From this solution, gross profit (value added minus labor cost) in country *j* in period 1 can be expressed as:

(3) $\left(p_1 \Omega_{j,1}{}^{\gamma} \right)^{\frac{1}{\beta}} C w_{j,1}{}^{-\frac{1-\beta}{\beta}} K_{j,1}$

where *C* denotes $(1–\beta)^{1/\beta}$ $(1/(1–\beta) –1)>0$. The firm's net profit from global activities in period 1 can be expressed as:

(4) $\sum_{j=1}^{n} \left(p_1 \Omega_{j,1}{}^{\gamma} \right)^{\frac{1}{\beta}} C w_{j,1}{}^{-\frac{1-\beta}{\beta}} K_{j,1} - \sum_{j=1}^{n} \rho_j g_j K_{j,0} - \sum_{j=1}^{n} \varphi(g_j) K_{j,0}$

where $K_{j,1}$ denotes capital stock in country j in period 1, g_j denotes the gross fixed capital investment ratio in coutry j (the ratio of gross fixed capital investment over the capital stock), and $\rho_j\, g_j\, K_{j,0}$ denotes the cost of financing investment in country j.[2] $\varphi(\,)$ is the adjustment cost function of investment, for which we assume a simple quadratic function:

(5) $\varphi(g_j)= g_j + \alpha g_j^2/2$

This implies that $K_{j,1}$ is determined as:

(6) $K_{j,1} = (1-\delta+g_j)K_{j,0}$

The first order condition for the optimal investment ratio g_j is expressed as:

(7) $$\begin{aligned}&\left(p_1\Omega_{j,1}{}^{\gamma}\right)^{\frac{1}{\beta}} Cw_{j,1}{}^{-\frac{1-\beta}{\beta}} K_{j,0} - \rho_j K_{j,0} - \varphi'(g_j)K_{j,0} \\ &= \left(p_1\Omega_{j,1}{}^{\gamma}\right)^{\frac{1}{\beta}} Cw_{j,1}{}^{-\frac{1-\beta}{\beta}} K_{j,0} - \rho_j K_{j,0} - \left(1+\alpha g_j\right)K_{j,0} = 0\end{aligned}$$

We solve for the optimal investment ratio, g_j:

(8) $$g_j = \frac{1}{\alpha}\left\{\left(p_1\Omega_{j,1}{}^{\gamma}\right)^{\frac{1}{\beta}} Cw_{j,1}{}^{-\frac{1-\beta}{\beta}} - \left(1+\rho_i\right)\right\}$$

The first term in parentheses on the right-hand side of (8) denotes the gross rate of return to capital in country j. The second term denotes capital cost, which might be different among countries because of a different (country) risk profiles for investments in different countries.

We cannot observe the price p_1, the shadow price of output in period 1, but given that this shadow price is equal for all countries, we can circumvent this problem in the following manner. Let $r_{j,1}$ denote the gross rate of return to capital in country j in period 1. Then, for any two countries, i and j, we have:

[2] We assume that the dissolution value of the firm at period 1 is zero.

$$(9)\quad \frac{r_j}{r_i} = \left(\frac{\Omega_{i,1}}{\Omega_{j,1}}\right)^{\frac{\gamma}{\beta}} \left(\frac{w_{i,1}}{w_{j,1}}\right)^{\frac{1-\beta}{\beta}}$$

Leading to:

$$(10)\quad r_i = \left(\frac{\Omega_{i,1}}{\prod_{j=1}^{n} \Omega_{j,1}^{\omega_j}}\right)^{\frac{\gamma}{\beta}} \left(\frac{w_{i,1}}{\prod_{j=1}^{n} w_{j,1}^{\omega_j}}\right)^{-\frac{1-\beta}{\beta}} \prod_{j=1}^{n} r_{j,1}^{\omega_j}$$

where ω_j denotes $K_j/\Sigma K_i$. The last term on the right-hand side of equation (10) is the geometric mean of the firm's local gross profit rate, where the share of fixed capital located in each country is used as a weight. We approximate this term by the MNE's global average gross profit rate, r_{av}.

From (3) we see that the marginal return to capital r_i is also equal to $\left(p_1 \Omega_{j,1}^{\gamma}\right)^{\frac{1}{\beta}} C w_{j,1}^{-\frac{1-\beta}{\beta}}$. Using this and substituting (10) in (8) we get the expression for the gross investment ratio in country *i*.

$$(11)\quad g_i = \frac{1}{\alpha}\left\{\left(\frac{\Omega_{i,1}}{\prod_{j=1}^{n} \Omega_{j,1}^{\omega_j}}\right)^{\frac{\gamma}{\beta}} \left(\frac{w_{i,1}}{\prod_{j=1}^{n} w_{j,1}^{\omega_j}}\right)^{-\frac{1-\beta}{\beta}} r_{av} - (1+\rho_i)\right\}$$

The gross investment ratio depends on the presence of agglomeration externalities in the country relative to the presence of such externalities in other countries, the relative wage rate, the global return on investment, and local capital costs.

3. Empirical Model and Data

Empirical Model

We choose a logarithmic specification to examine the relationship between the gross fixed capital investment ratio of firm *i* in country *j*, and relative production, relative wage, the return on investment, and local capital costs.

$$(12) \qquad \log(g_{j,i}) = \alpha_o + \alpha_1 \log\left(\Omega^*_{j,k}\right) + \alpha_2 \log(w^*_{j,k}) + \alpha_3 \log(r_i) + \alpha_4 \log(\rho_j)$$

Where an asterisk indicates that variables are taken relative to the fixed assets weighted sum over all countries in which the firm is active, and a subscript k indicates that the variable varies by industry as well as by country. We augment the equation by adding the geographic distance from Japan as an indicator of trade costs and costs of managing dispersed affiliates (we expect a negative sign) and the effective local enterprise tax rate, controlling for tax (dis)incentives for investments. In addition, we augment the equation by allowing for liquidity constraints faced by the multinational firm. Such constraints affect the inter-temporal distribution of investment. If the multinational firm faces such constraints during period 0, this will restrict the execution of planned investments in the period. Investments are then postponed to period 1 (cf. Harrison and McMillan, 2003).

Data

We draw our data on overseas affiliates of Japanese firms from the sixth Basic Survey of Overseas Business Activities held in 1996 (data for fiscal year 1995) and the 27th Trend Survey of Overseas Business Activities held in 1997 (data for fiscal year 1996). The Basic Survey is an extensive survey among Japanese multinational firms conducted every 3 years and the Trend Survey is a shortened survey conducted the two years between the Benchmark Surveys. Both surveys are conducted by the Japanese Ministry of Economy, Trade and Industry (METI, former MITI). The response rates of the surveys at the parent firm level are 60.4% and 59.1%, respectively, but since non-responding firms are usually small in size, the coverage in

terms of global affiliates is higher. Affiliate data on capital stocks are only included in the Basic Survey, but gross fixed capital investment data are included in all surveys. We analyze investments in fiscal year 1996 (the year ending March 1997) as a ratio of the capital stock at the end of fiscal year 1995 (March 1996). Data on Japanese parent firms were drawn from the third and the fourth Basic Survey of Japanese Business Structure and Activities held in 1996 and 1997 by METI (data for fiscal 1995 and 1996). This survey is mandatory and has response rate exceeding 90 percent.

We selected parent firms active in manufacturing industries and responding in both years to the overseas business and domestic activity surveys. Since quite a few firms tend to respond erratically to the foreign activity survey, this reduced our sample substantially. Second, for these firms we needed to aggregate investment and other data at the foreign country level. This required reliable item responses for all relevant variables (investments, assets, etc.) for all affiliates of the parent in a country. Since the response rate for fixed capital investments at the affiliate level is about 60 percent and parent-country observations had to be omitted if only one of the affiliates in a country failed to respond on this item, this further reduced our sample for analysis. Third, we aimed for a representative sample of investment decisions for the remaining firms. Hence, we required that the coverage of the investments in our sample for a parent firm was at least 50 percent of the sum of reported investments by the firm. Last, the sample was reduced somewhat due to unavailability of explanatory variables (mainly industry growth). All this left us with 605 parent-country observations.

Variables

The gross investment ratio is total gross fixed capital investment of the firm in a country in fiscal year 1996 divided by the value of the firm's fixed tangible assets in the country at the end of fiscal year 1995. The global profit rate is the global return on assets (ROA) of the firm, calculated as total operating profit of the parent and all its affiliates (total sales – cost of goods sold – cost of selling and general administrative expenses) in fiscal year 1996 divided by total assets in the world at the end of fiscal year 1995. The relative wage rate is the average industry wage rate in the country divided by the average industry wage rates in all other countries weighted by the firm's fixed tangible assets in each country in 1996. We calculated the average wage

rate as total salary paid divided by the total number of employees by industry and country, using data on salaries and employees of the population of Japanese manufacturing affiliates in the industries and countries in 1996 present in the survey for 1996. Relative production is measured as industry output in country *i* divided by industry output in all other countries weighted by the firm's fixed tangible assets in each country in 1996. The industry output data by country were collected from UNIDO (2003) and the OECD's STAN database for industry analysis. For China data were taken from the China Statistical Yearbook and for Taiwan data were drawn from Input-Output Tables published by the Republic of China's Statistics Bureau. We also use relative industry growth as an alternative, dynamic, measure of production externalities. This is the growth rate of industry output in country *i* divided by growth rate of industry output in all other countries weighted by the firm's fixed tangible assets in each country between 1994-1996.[3] Differences in local capital costs are proxied by the relative country risk index, defined as the possibility of default in country *i* divided by possibility in all other countries weighted by the firm's fixed tangible assets in each country in 1996. The data were taken from Institutional Investor. Liquidity constraints faced by the firm in period 0 are measured by the firm's global coverage ratio in 1995. The global coverage ratio is calculated as total interest payments divided by total interest payment plus cash flow in the world at the end of fiscal 1995. Here global cash flow is calculated as total cash flow (total – cost of goods sold – total salary paid – tax payments). The relative effective tax rate is the average effective tax rate in country *i* divided by average effective tax rate in all other countries weighted by the firm's fixed tangible assets in each country in fiscal 1996. We calculated the average effective tax rate as (profits – profits after tax)/(profits) for each country by using profit and tax data from the total population of Japanese affiliates represented in the 27th Trend Survey of Overseas Business Activities. The Japanese effective tax rate was calculated from the fourth Basic Survey of Japanese Business Structure and Activities for the total population of Japanese affiliates represented in the survey. Distance from Japan is the distance (km) from Tokyo to the capital city of country *i*, calculated from the latitude and longitude of Tokyo and the respective capital cities. All the dependent and explanatory variables are taken in logarithmic form.

[3] We add one to all growth rates, to maintain positive values in case of negative growth.

4. Empirical Results

We estimate the augmented model with robust regression for the full sample of 605 observations, and separately for a sample of nine Asian countries (345 observations). If Japanese affiliates in Asia are more of the 'vertical' type, stronger interaction between investments in the different Asian countries based on cost competition can be expected. The empirical results are presented in Tables 1 and 2. In the full sample (Table1), the gross fixed capital investment ratio is significantly and positively affected by the firm's global return on assets. The relative wage rate and relative country risk have the expected negative impact and are significant as well. Relative output growth for the industry and country as a measure of production externalities is positive but not significant. Substituting relative output levels at the industry and country (not reported here) does not change these results. Of the other variables, the coverage ratio in 1995 has a significantly positive impact. This result is similar to findings in Harrison and MacMillan (2003) and suggests that firms that were liquidity constrained in the past year, postpone investment decisions to the current year. Distance from Japan and the relative effective tax rate have no significant impact.

Overall the results provide support for the model of fixed capital investment locations.[4] The fit of the model improves further if the analysis is limited to nine Asian countries. The explained variance increases and all variables for which an effect was hypothesized have the correct sign and are significant: the relative output growth measure now is significantly positive as expected. Also, the estimated coefficients of the variables increase substantially in magnitude, indicating greater sensitivity of investment decisions to relative country characteristics. These findings are in accordance with the notion that much Japanese FDI in Asia is motivated by the need to reduce costs and that Asian countries compete on costs to attract such investments. In addition, countries with important production growth potential and lower financial risk are the most attractive locations for fixed capital investments.

[4] Although the explained variance appears to remain rather small (an R-square of 7.6 percent) this is also due to the choice of logarithmic form for the ratio of investment to fixed assets. The logarithmic transformation inflates the variance in the dependent variable given that values for the investment ratio are often close to zero.

5. Conclusions

This paper was the first to examine empirically the determinants of fixed capital investments abroad in a large sample of multinational firms. We developed a simple model of the global allocation of fixed capital investments by a multination firm. The analysis suggested that the investment ratio by the firm in a country should be positively related to its global return on assets, the relative importance of agglomeration externalities in production in the country as compared to the firm's global production operations, and negatively related to the relative wage and relative country financial risk. We examined 605 fixed capital investment decisions at the firm and country level taken by Japanese multinational firms in 1996 and found broad support for the model's predictions. Global return on assets increase investment rates, while relative wages in the industry and country and relative country risk reduce them. No significant effect was found for output growth in the industry and country as a measure of agglomeration externalities in production, but we did find a positive and significant impact of this variable for a sub-sample of Japanese firms' investments in Asia. In general, the sensitivity of investment rates to the country's relative performance in terms of output growth, wages, and risk is substantially greater for the Asia sample as compared with the full sample (including developed countries). This confirms the results of affiliate location studies that Asian countries are competing in attracting cost oriented manufacturing investments by foreign multinationals. Keeping effective wage levels in check, e.g. by allowing the currency to depreciate, and maintaining sound financial policies increase a country's share of multinationals' fixed capital investments. The results did not suggest that effective tax rates have an additional impact on Japanese multinational firms' investments. The findings did suggest that liquidity constraints faced by these multinational firms lead to the postponement of investments.

Our still rather preliminary results suggest a number of fruitful improvements and extensions in future research. The theoretical model that provided background for our empirical analysis, abstracted from demand effects and trade costs. Hence, the model was more relevant for vertical, cost reducing FDI, then for horizontal FDI motivated by trade barriers and local demand enhancing impacts of FDI. Future work should attempt to integrate the two models of foreign investments explicitly. Empirically,

future models of fixed capital investments preferably take into account the dynamics of investment processes, which can only be uncovered through the use of panel ata. Future work should combine METI survey data at the affiliate level in different years to trace fixed investments over time. The main data problem in this case will remain the absence of capital stock data in the intermittent years between the Basic Surveys. Last but not least, the interaction between fixed capital investments in Japan and the rest of the world is another issue of particular policy concern and should be subject of future empirical analysis.

References

Aitken, B., Hanson, G. H., and A.E. Harrison, 1997, Spillovers, Foreign Investment, and Export Behavior. American Economic Review 43, 103-132.

Amano, T., K. Fukao, and M. Toyonaga, 1998, The Impact of Production Activities of Japanese Subsidiaries Abroad on Exports and Imports by their Parent Firms, paper presented at the International Symposium on Foreign Direct Investment in Asia, Economic Research Institute, Economic Planning Agency , Tokyo, October 1998.

Belderbos, R., 1992, Large Multinational Enterprises Based in a Small Economy: Effect on Domestic Investments, Weltwirtschaftliches Archiv 128, 543-583.

Belderbos, R., 1998, Japanese Electronics Multinationals and Strategic Trade Policies, Oxford University Press, Oxford, 1997.

Belderbos, R.A and M. Carree, 2002, The Location of Japanese Investments in China: Agglomeration Effects, Keiretsu, and Firm Heterogeneity, Journal of the Japanese and International Economies 16 (2), 194-211.

Belderbos, R.A, G. Capannelli and K. Fukao, 2001, Backward Vertical Linkages of Foreign Manufacturing Affiliates: Evidence from Japanese Multinationals, World Development 29 (1), 189-208.

Belderbos, R.A. and L. Sleuwaegen, 1996, Japanese Firms and the Decision to Invest Abroad: Industrial Groups and Regional Core Networks, Review of Economics and Statistics 78, 214-220.

Belderbos, R.A. and L. Sleuwaegen, 1998, Tariff Jumping DFI and Export Substitution: Japanese Electronics Firms in Europe, International Journal of Industrial Organisation 16 (5), 601-638.

Blomstrom B. and I. Kokko, 1998, Multinational Corporations and Spillovers, Journal of Economic Surveys 12 (3), 247-277.

Blomström, M. D. Konan, and R.E. Lipsey, 2000, FDI in the Restructuring of the Japanese Economy, NBER Working Paper w7693, NBER.

Blomström, M. R.E. Lipsey, and K. Kulchycky, 1988, US and Swedish Direct Investment and Exports, in: R. E. Baldwin, ed., Trade Policy Issues and Empirical Analysis, University of Chicago Press, Chicago.

Blomström, M., G. Fors, and R.E. Lipsey, 1997, Foreign Direct Investment and Employment: Home Country Experience in the U.S. and Sweden, The Economic Journal 107, 1778-1797

Bond, Steven, and John van Reenen, 2001, Micro-econometric Models of Investment and Employment, in: James Heckman and Edward Leamer (eds.), Handbook of Econometrics Volume IV, Amsterdam: Kluwer.

Borensztein, E., Gregorio de J., J-W. Lee, 1998, How Does Foreign Direct Investment Affect Economic Growth? Journal of International Economics 45, 115-135.

Braconier, H. and K. Ekholm, 2000 Swedish Multinationals and Competition from High- and Low-Wage Locations, Review of International Economics 8, 448-461.

Brainard, S.L. and D.A. Riker, 1997, Are U.S. Multinationals Exporting U.S. Jobs? NBER Working Paper 5958.

Braunerhjelm, P. and L. Oxelheim, 2000, Does Foreign Direct Investment Replace Home Country Investment? The Effect of European Integration on the Location of Swedish Investment, Journal of Common Market Studies 38 (2), 199-221.

Campa, J.M, and Goldberg, L, 1995, Investment in Manufacturing, Exchange Rates, and External Exposure, Journal of International Economics 38 (3), 297-321.

Caves, R., 1996, Multinational Enterprise and Economic Analysis, Cambridge: Cambridge University Press

Feenstra, R.C., and G. Hanson, 1986, Globalisation, Outsourcing, and Wage Inequality, American Economic Review 86, 220245.

Feldstein, M., 1994, The Effects of Outbound Foreign Direct Investment on the Domestic Capital Stock, NBER Working paper, No. 4668.

Fukao, K., 1995a, Outward Direct Investment and Jobs in Japan, The Monthly Journal of The Japan Institute of Labour 37 (7), 2-12. (in Japanese)

Fukao, K., 1995b, Overseas Production and Exports: A Survey of the Empirical Research, MITI Research Review 5, 185-200. (in Japanese).

Fukao, K., 1996, Investing Abroad or within Japan?: An Empirical Analysis of the Investment Location of Japan's Manufacturing Industries, The Economic Review 47 (1), 47-63.(in Japanese).

Fukao, K., H. Ishido, and K. Ito, forthcoming, Vertical Intra-Industry Trade and Foreign Direct Investment in East Asia, The Journal of the Japanese and International Economies.

Hanson, G., R. Mataloni and M. Slaughter, 2001, Expansion Strategies of U.S. Multinational Firms, NBER working paper 8433.

Harrison, Ann E. and Margaret S. McMillan, 2003, Does Foreign Direct Investment Affect Domestic Credit Constraints? Journal of International Economics 61, 73-100.

Head, K. and J. Ries, 2001, Overseas Investment and Firm Exports, Review of International Economics 9 (1), 108-123.

Head, K. and J. Ries, 2002, Offshore Production and Skill Upgrading by Japanese Manufacturing Firms, Journal of International Economics 58, 81-105.

Hoshi, Takeo, Anil Kashyap, and David Scharfstein, 1991, Corporate Structure, Liquidity, and Investment: Evidence from Japanese Industrial Groups, The Quarterly Journal of Economics 107, 33-60.

Ito K. and K. Fukao, 2003, Vertical Intra-Industry Trade and the Division of Labor in East Asia, Institute of Economic Research Discussion Paper Series A No 444, Hitotsubashi University. Paper prepared for the Fourteenth Annual East Asian Seminar on Economics and International Trade, Taipei, September 2003.

Japan External Trade Organization (JETRO) (2001), *Chugoku Choki KeizaiTokei* [China Long-term Economic Statistics], Japan External Trade Organization.

Kogut, B. and S.-J. Chang, 1996, Platform Investments and Volatile Exchange Raters: Direct Investment in the U.S. by Japanese Electronic Companies, Review of Economics and Statistics 78 (2), 221-231.

Konings, J. and A. P. Murphy, 2003, Do Multinational Enterprises Relocate Employment to Low Wage Regions: Evidence from European Multinationals, LICOS working Paper, Katholieke Universiteit Leuven.

Lipsey, Robert E., and Merle Yahr Weiss, 1984, Foreign Production and Exports of Individual Firms, The Review of Economics and Statistics 66, 304-308.

METI (Ministry of Economy, Trade and Industry of Japan, various years, Kaigai Jigyou Kihon Chosa (Basic Survey of Overseas Business Activities), Tokyo: METI.

METI (Ministry of Economy, Trade and Industry of Japan, various years, Kigyou Katsudou Kihon Chousa (Basic Survey of Japanese Business Structure and Activities) , Tokyo: METI.

METI (Ministry of Economy, Trade and Industry of Japan, various years, Kigyou Doko Chousa (Quarterly Survey of Business Activities), Tokyo: METI.

Miyagawa, T., 2003, International Competitiveness of Japan's Industries and the Hollowing Out Issue, in: T. Miyagawa, ed., Hollowing Out of Manufacturing Sector and Japanese Economy," ed., Japan Center of Economic Research. (in Japanese).

National Bureau of Statistics of China (various years), *China Statistical Yearbook*, China Statistics Press.

Noorzoy, M.S. (1980), 'Flows of Direct investment and Their Effects on U.S. Domestic Investment', Economic Letters, Vol. 5, pp. 311-317

Slaughter, M, 2000, Production Transfer Within Multinational Enterprises and American Wages, Journal of International Economics 50, 449-472.

Stevens, G. and R. Lipsey, 1992, Interactions Between Domestic and Foreign Investment, Journal of International Money and Finance, 40-62.

UNIDO (2003), *Industrial Statistics Database* at the 3-digit level of ISIC Code (Rev.3), United Nations Industrial Development Organization.

Table 1. Determinants of the gross fixed capital investment ratio, all countries

	Coef.	Robust Std. Err.	
ROA	0,8929	0,2626	***
Relative wage	-0,6224	0,2277	***
Relative output growth	0,3729	0,5132	
Relative country risk	-0,8686	0,2994	***
Relative effective tax rate	0,3809	0,9567	
Distance from Japan	0,3432	0,2951	
Coverage ratio	0,3855	0,1621	**
Constant	-0,8081	3,1489	
Observations	605		
F (7, 597)	4,1		***
R squared	0,076		

Note: **, *** is significant at the 5 and 1 percent levels, respectively.

Table 2. Determinants of the gross fixed capital investment ratio, Asian countries

	Coef.	Robust Std. Err.	
ROA	1,1128	0,3148	***
Relative wage	-1,1544	0,4660	**
Relative output growth	1,0811	0,4300	**
Relative country risk	-1,4815	0,6221	**
Relative effective tax rate	1,8274	1,6367	
Distance from Japan	-0,4377	0,6190	
Coverage ratio	0,6399	0,2254	***
Constant	7,6407	5,7046	
Observations	345		
F (7, 597)	4,51		***
R squared	0,12		

Note: **, *** is significant at the 5 and 1 percent levels, respectively.