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Japanese Foreign Direct Investment and Regional Trade¹

Prepared by Tamim Bayoumi and Gabrielle Lipworth

Authorized for distribution by Guy M. Meredith

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Abstract

We examine the relationship between Japanese FDI outflows, domestic and foreign fixed investment, and the exchange rate. The results indicate that aggregate FDI outflows have been driven by investment in Japan and the exchange rate, while the geographic distribution of such investment has been influenced by foreign economic conditions. We also find that FDI outflows have a temporary impact on exports but a permanent effect on imports. We find no evidence that behavior with respect to East Asia differs from that with respect to North America or Europe.

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Author's E-Mail Address: tbayoumi@imf.org.

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Contents		Page
Summary		3
I. Introduction		4
II. Overview of Past Movements in Foreign Direct Investment		5
III. Literature Survey		10
IV. Theoretical Considerations		14
V. Determinants of Japanese FDI		16
VI. FDI and Japanese Trade Patterns		22
VII. Conclusions		27
Text Tables		
1. Basic FDI Regression Results, 1983-95		18
2. FDI Regressions: Alternative Specifications		21
3. FDI Regressions: Alternative Independent Variables		22
4. Export Regressions, 1985-95		25
5. Import Regressions, 1985-95		26
Charts		
1. Japanese Foreign Direct Investment, 1982-95		6
2. Sectoral Competition of FDI Outflows		8
3. Geographical Composition of FDI Outflows		9
4. FDI Inflows to Japan		11
5. Comparison of Alternative Data on FDI Outflows, FY 1982-95		30
Appendix		29
References		33

SUMMARY

There has been considerable debate in Japan about the impact of foreign direct investment (FDI) outflows, largely focused on whether the economy is “hollowing out.” The surge in outward Japanese FDI over the last decade, together with the fact that FDI outflows outweigh corresponding inflows by an order of magnitude, has resulted in a rapid net movement of Japanese productive capacity abroad. The relocation of Japanese production abroad is also thought to have led to changes in Japan’s trade structure.

The first part of the paper examines FDI outflows to determine whether, besides the “natural” maturation of the economy, FDI can be explained by macroeconomic factors. The results suggest that it can. Aggregate FDI has been driven by investment in Japan and the exchange rate, while the geographic distribution of such investment has been influenced by foreign economic conditions. The link with the real exchange rate has been well established. The close relationship between domestic investment and outward FDI is of more interest, as it implies that FDI is a complement to, rather than a substitute for, domestic capital.

We then examine the relationship between FDI outflows and Japanese trade patterns. Estimation suggests that FDI has only a temporary impact on Japanese exports, while a higher stock of Japanese FDI in a foreign country has permanently affected imports, increasing merchandise imports by around 10 percent between 1990 and 1995.

A plausible interpretation of both sets of results is that Japanese firms are diversifying the location of their production, moving those parts of their operations in which they are losing comparative advantage off-shore. While the recent depreciation of the yen is likely to temper such a relocation, Japanese FDI outflows are part of a difficult, but necessary, restructuring of the Japanese economy.

I. INTRODUCTION

There has been considerable debate in Japan about the impact of foreign direct investment (FDI) outflows, largely focused on whether the economy is “hollowing out.” The surge in outward Japanese FDI over the last decade, together with the fact that FDI outflows outweigh corresponding inflows by an order of magnitude, has resulted in a rapid net movement of Japanese productive capacity abroad. With Japanese manufacturing firms losing competitiveness in the production of relatively labor-intensive goods, there is concern that the rise in domestic production of capital and technology-intensive goods will not be sufficient to absorb the slack, thereby eroding the manufacturing base of the Japanese economy and hurting domestic employment.²

The relocation of Japanese production abroad has also led to changes in Japan’s trade structure. While the historical behavior of trade volumes and prices can largely be accounted for by movements in relative prices and income, structural change in exports and imports appears to have been a prominent factor more recently.³ In particular, the sharp decline in the trade balance from 1994 to mid-1996 appears to have partly reflected structural developments such as: a shift in exports toward capital- and technology-intensive goods; an increase in the share of manufactured goods in imports; and, in particular, an expansion of “reverse imports” from Japanese affiliates abroad. These trends, in turn, have largely been attributed to the relocation of Japanese production abroad, spurred by yen appreciation and the economic development of the East Asian region.

This paper analyzes the behavior of Japanese FDI, with particular emphasis on its determinants and the implications for Japan’s trade patterns, using bilateral data on Japanese FDI flows and trade flows with 20 of her major trading partners in East Asia, North America, and Europe. Bilateral data allows one to differentiate behavior across different regions of the world, and hence to examine whether the behavior of FDI and trade flows between Japan and East Asia is quantitatively different from that between Japan and her other major partners. Another advantage of using bilateral data is that they allow more information to be gleaned about underlying causes than is possible from considering aggregate series. This is particularly true if, as in this case, the sample period for the analysis is relatively short.⁴

²MITI estimates the overseas production ratio of Japanese firms, that is, the ratio of production abroad to total production, to be slightly below 10 percent. This is lower than other major industrial countries (for example, the ratio is about 20 percent for the United States). For a more detailed discussion of the MITI data, see Kawai and Urata (1995).

³See Bank of Japan (1996) for a discussion.

⁴The estimation period used is 1982–95. Japanese FDI was subject to restrictive exchange rate regulations prior to this time that circumscribed its movement, and distorted market

(continued...)

The rest of the paper is organized as follows. The next section describes past movements in Japanese FDI. Section III contains a review of earlier work on FDI, with particular emphasis on Japan. Section IV provides a theoretical framework for FDI flows, while Section V reports the results from panel regressions using this framework. Section VI studies the relationship between FDI and Japan's trade, while Section VII presents conclusions.

II. OVERVIEW OF PAST MOVEMENTS IN FOREIGN DIRECT INVESTMENT⁵

There are three striking features to the behavior of Japanese FDI since the early 1980s.⁶ First, outflows have exceeded inflows by more than an order of magnitude; indeed, this gap has been rising rapidly over time as FDI outflows have increased significantly (Chart 1, upper panel). Second, outflows of Japanese FDI have shown a notable cyclical pattern, plausibly reflecting movements in the yen and activity in Japan and her major trading partners (Chart 1, lower panel). Finally, important changes in the sectoral and regional composition of FDI outflows have occurred over the period.

With the liberalization of capital controls, Japanese FDI outflows have surged since the early 1980s. Although inflows to Japan remained approximately constant at about $\frac{1}{4}$ percent of net fixed investment between 1982 and 1993, outbound Japanese FDI rose from $2\frac{1}{2}$ percent to 3 percent of domestic investment, translating into a significant net movement in productive capacity abroad. By 1993, the stock of outward Japanese FDI stood at \$422.5 billion, almost fifteen times the stock of FDI in Japan of \$29.9 billion.

Outbound Japanese FDI has also shown considerable cyclical variation over the period. In the first half of the 1980s, overseas investment increased briskly, in part to avoid automotive trade frictions with North America and Europe, to reach \$12.2 billion by 1985 (around 1 percent of GDP). Even more rapid growth was experienced in the second half of the decade, likely reflecting booming economies at home and abroad and yen appreciation in

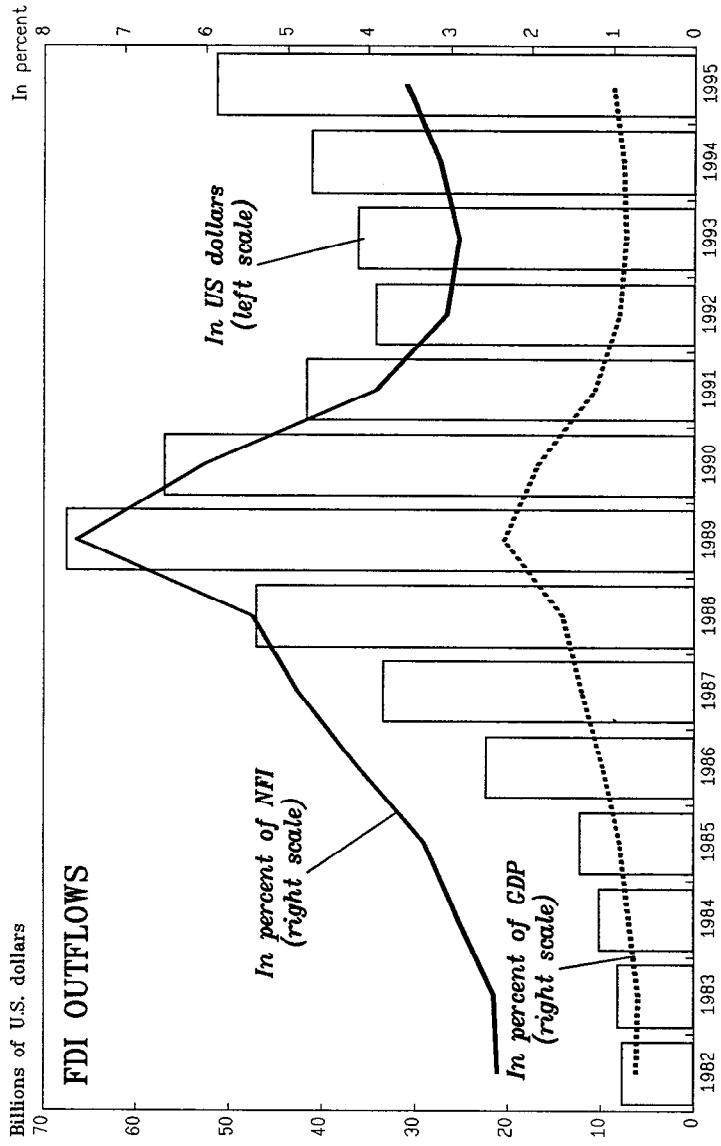
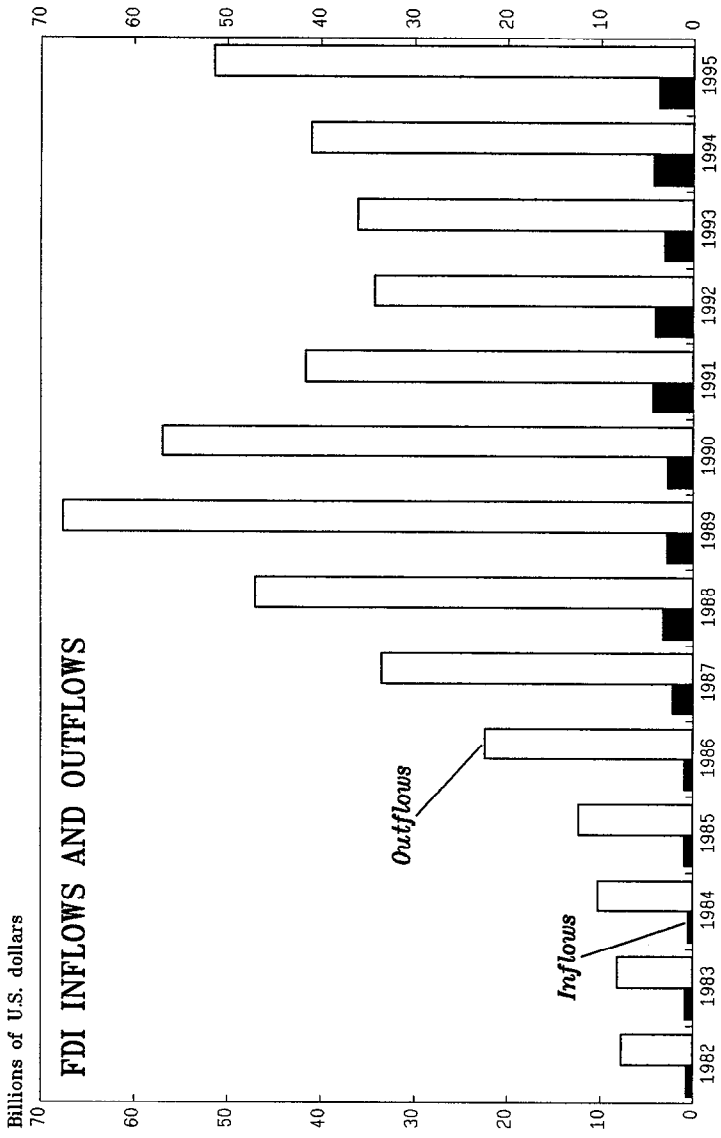
⁴(...continued)

responses, limiting the value of the information that can be obtained from earlier data.

⁵See also Kawai and Urata (1995 and 1996) for discussions of FDI trends and motivations.

⁶There are two sources of data on Japanese FDI—the balance of payments statistics and Ministry of Finance “notification” data. This study focuses on Ministry of Finance data, as they are the only source that disaggregates flows by country and industrial sector. See the appendix for a discussion of the advantages and disadvantages of this data set.

CHART 1
JAPAN
JAPANESE FOREIGN DIRECT INVESTMENT, 1982-95



the latter part of the decade; during the period 1986–89, nominal FDI outflows in dollars exceeded the cumulative overseas investment from all previous post-war years combined. By the late 1980s, Japan's FDI outflow had become the largest in the world, and a peak of \$67.5 billion was reached in 1989 (around 2½ percent of GDP). The boom in Japanese FDI, however, came to an abrupt end in the early 1990s, with the annual outflow declining steadily, both in absolute terms and relative to GDP and fixed investment. This downturn reflected the sharp decline in asset prices in 1990, that triggered severe balance sheet difficulties in the business sector, and resulted in a deep and protracted economic slump. These flows have showed some recovery more recently, spurred by the appreciation of the yen in 1993–94 and in the spring of 1995, and a pickup in domestic investment.

Coinciding with the cyclical movements in outbound FDI, there have been notable changes in its regional and sectoral composition (Charts 2 and 3). While producers increased their investment in North America precipitously in the 1980s, in recent years, investment in Asia has grown most rapidly.⁷ Indeed, during the 1980s, the share of FDI outflows received by industrial countries rose to absorb over three fourths of the total, with the United States alone receiving close to one half, whereas the share received by developing countries (including Asia) declined from one half to around one quarter. Coincident with such a development was the spectacular growth in overseas investment in the tertiary sectors, including finance, insurance, transport and real estate, while the share of FDI in manufacturing and mining declined sharply.⁸

The post-bubble period has witnessed a partial reversal of the trends exhibited in the 1980s in both the regional and sectoral composition of Japanese FDI outflows. Regionally, the share of FDI to developing countries has risen to the early 1980s level, and the share received by Asia within this total has increased substantially, while FDI flows to industrial countries have declined, particularly that to the United States. At the same time, the share of FDI outflows in manufacturing has also increased significantly. Data which disaggregate FDI outflows by

⁷In response to trade frictions with North America and Europe in the late 1970s and early 1980s, Japanese automakers began to shift their production overseas. Although trade tensions eased following the yen's rapid appreciation in the late 1980s, the relocation of production abroad continued, as loss of competitiveness became a major concern for automakers. Production at Japanese affiliates in Asia also expanded in the mid-1980s, against the background of increased domestic demand, lower production costs, and the host countries' policy stance. The process gathered further momentum in the early 1990s with further growth in demand and improved local technology.

⁸During the 1980s, the tertiary sectors, which during the 1970s had accounted for less than half of the total FDI outflow, gained a combined share of more than 70 percent. At the same time, the share received by the manufacturing sector declined to below one-fourth of total FDI from around one-third, and the share to primary products (mostly accounted for by mining), fell from around 10 percent of the total to about 2 percent.

CHART 2
JAPAN
SECTORAL COMPOSITION OF FDI OUTFLOWS

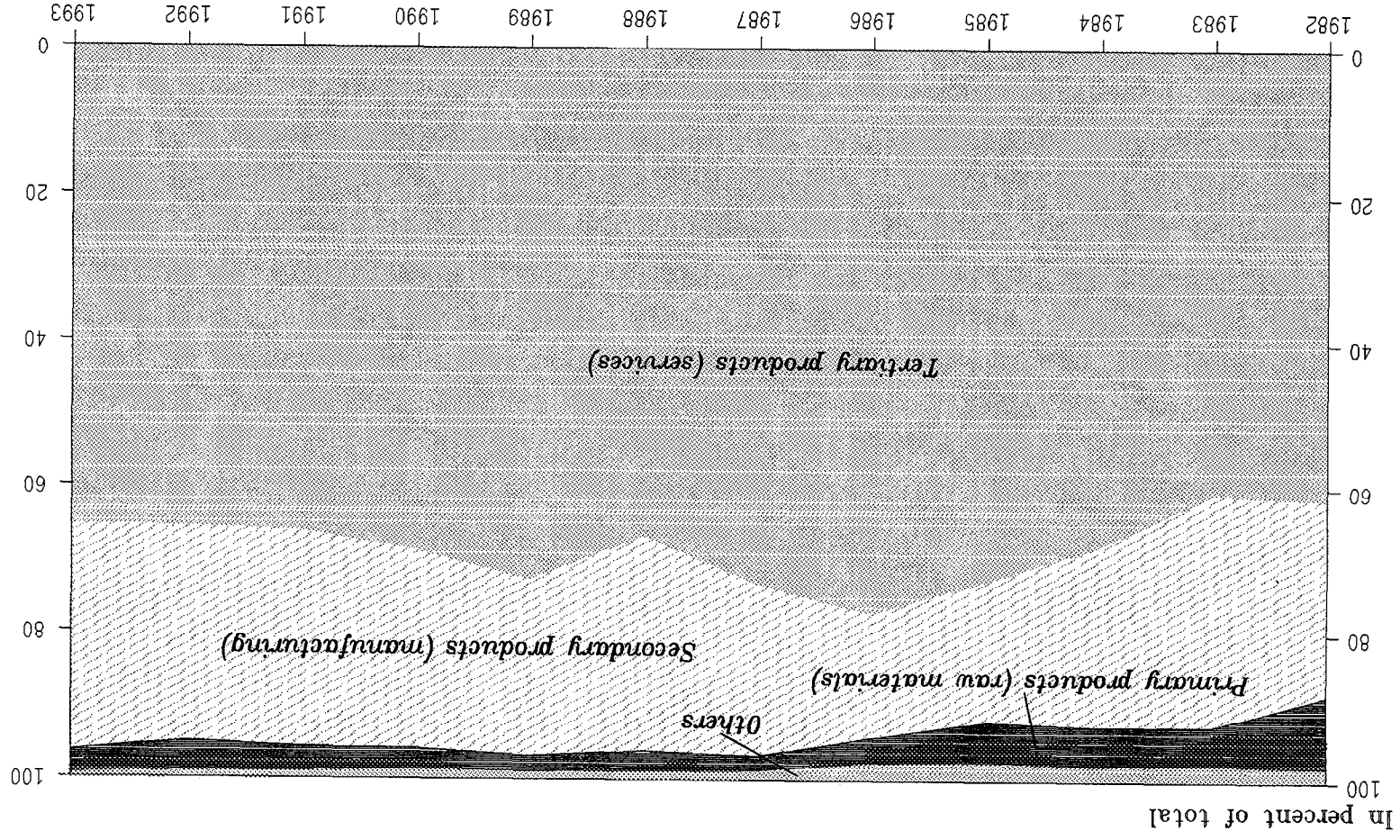
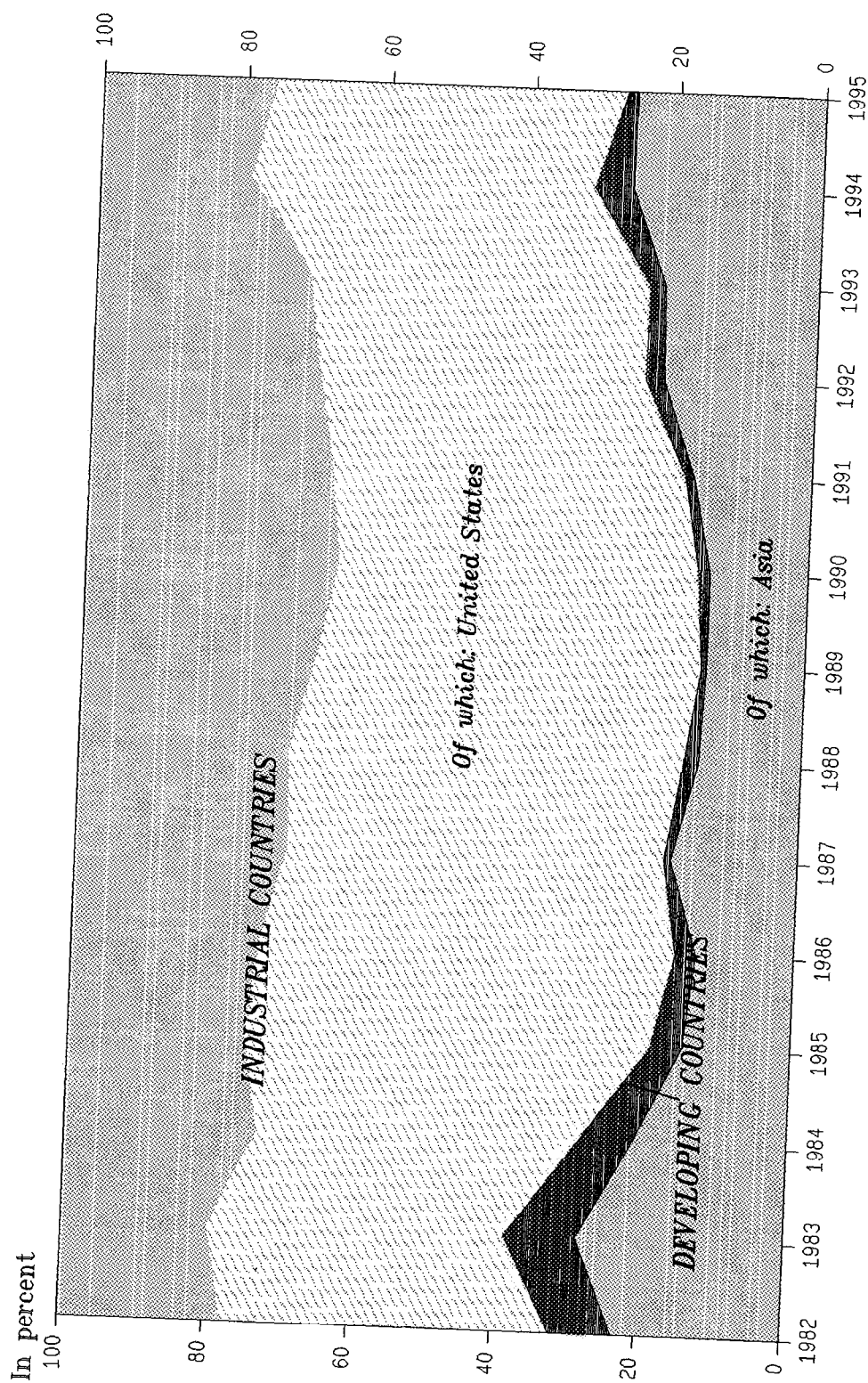


CHART 3
JAPAN
GEOGRAPHICAL COMPOSITION OF FDI OUTFLOWS



broad sector and geographic region confirm that these changes in the location of FDI outflows and their composition are related. For example, in 1995 only about a quarter of FDI flows to North America or Europe were in manufacturing, compared to 65 percent of the flows to Asia. Thus, as FDI outflows to the Asian region have risen, so too has investment in manufacturing, with particular emphasis on chemical products and machinery.

It is difficult to discern trends in the geographical composition of FDI inflows to Japan, given the small size and “lumpy” nature of commitments (Chart 4). Flows from North America still account for the lion’s share of FDI into Japan, although its share appears to have declined in the early 1990s to around one half from around three quarters in the 1980s. Flows from Europe have fluctuated through the period, but appear to have risen marginally in the 1990s, while Asia’s share has remained more or less constant at around 5 percent. Sectorally, there has been a decline in FDI inflows into the manufacturing sector in the 1990s; this gap has been filled by investment in the service sector.

The discussion of past movements in Japanese FDI sets the stage for some of the issues that will be addressed in the rest of the paper:

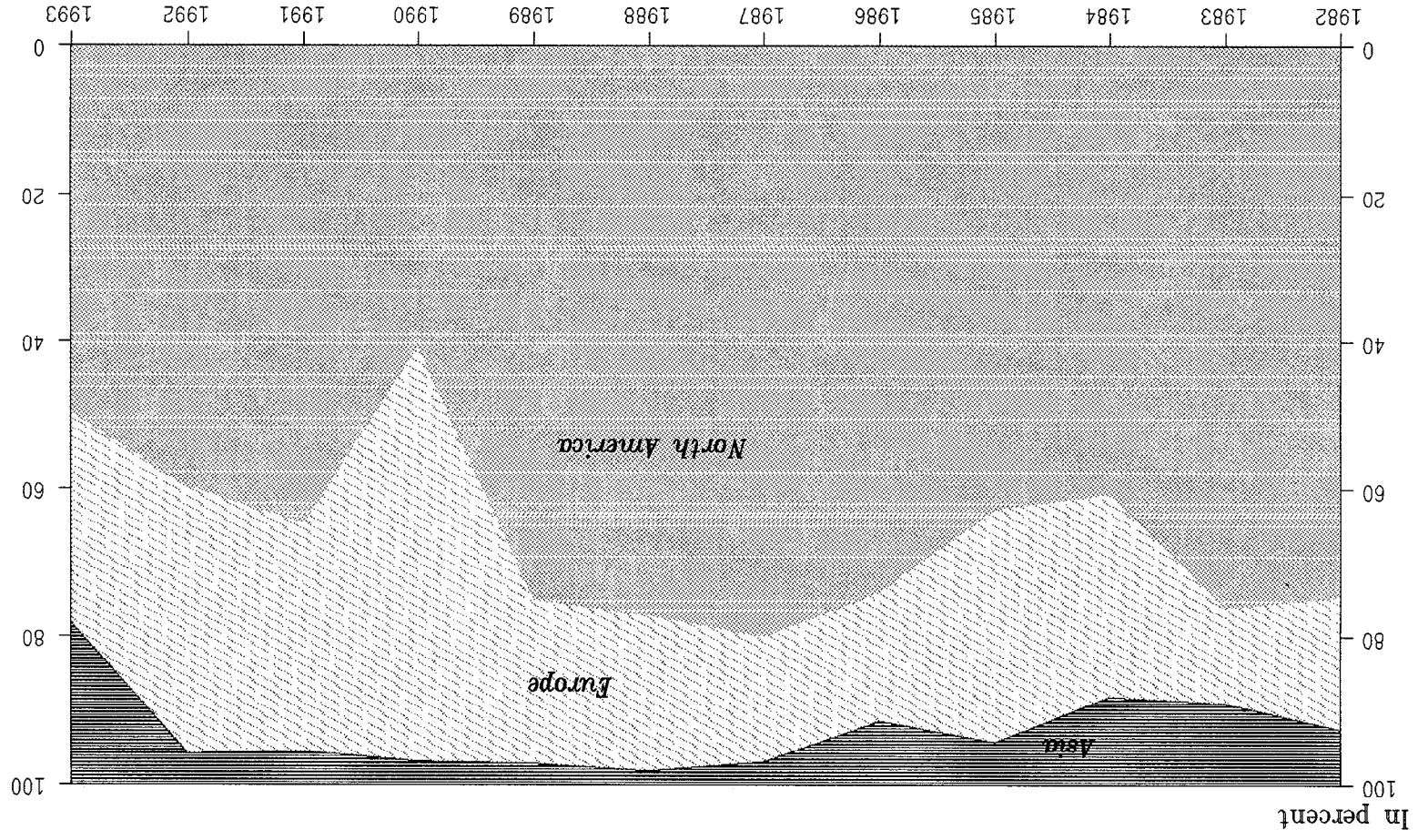
- What have been the main factors responsible for the rapid growth in FDI? Is the increase solely associated with a secular process of industrial restructuring, or are macroeconomic factors (exchange rate movements, cyclical movements in activity in Japan and her trading partners) also important?
- To what extent can the regional composition of Japanese FDI outflows be explained by macroeconomic factors? And, is the behavior of FDI and trade flows between Japan and East Asia quantitatively different from that between Japan and her other major partners?
- Has FDI had a significant impact on Japan’s economy, especially Japan’s trade structure? Are Japanese exports and FDI complementary, and does FDI generate increased imports from overseas subsidiaries?
- Is the relocation of Japanese manufacturing abroad likely to continue even with a weaker yen, resulting in the continued decline in the current account surplus, or is it likely to decline?

III. LITERATURE SURVEY⁹

Theories of FDI—and Japanese FDI in particular—can essentially be divided into two categories: micro (industrial organization) theories and macro (cost-of-capital) theories. The

⁹Surveys of the literature on FDI include Graham (1995), Harris and Ravenscraft (1992), and Lizondo (1990).

CHART 4
JAPAN
FDI INFLOWS TO JAPAN



early literature explained FDI in microeconomic terms, focusing on market imperfections and the desire of multinational enterprises to expand their monopolistic power, to penetrate profitable oligopolistic foreign markets, or to retaliate for or preempt foreign competitors' entry (Hymer, 1960, Kindleberger, 1969, and Caves, 1971). Subsequent research in this line of enquiry has centered more on firm-specific advantages due to product superiority or cost advantages, stemming from economies of scale, multiplant economies and advanced technology, or superior marketing and distribution (Vernon, 1974, Dunning, 1974, and Porter, 1986). According to this view, multinationals find it cheaper to expand directly in a foreign country rather than through trade in cases where the advantages associated with cost or product are based on internal, indivisible assets based on knowledge or technology.

Proponents of this microeconomic approach to Japanese FDI suggest that much of it has been in response to industrial restructuring and evolving comparative advantage, with investment occurring in countries and industries that complemented its trading positions. Historically, Japanese FDI was directed toward natural resource development and labor-intensive manufacturing. The FDI in natural resource extraction represented a form of backward vertical integration by Japanese users of raw materials that strengthened Japan's traded goods sector by securing sources of supply. Despite the direct loss of domestic capacity, investment in manufacturing in neighboring Asian countries can also be seen in this light, as it has represented a transfer of production abroad in a sector where Japan has been losing comparative advantage. For the more recent period, Kogut and Chang (1991) and Hennart and Park (1991) have established a positive relationship between the rapid growth of R&D expenditure by Japanese firms and Japan's FDI, consistent with the view that overseas investment uses intangible assets accumulated by firms in the source country.

Alternative explanations for FDI have focussed on regulatory restrictions—including tariffs, quotas, and other import-substituting policies—that either encourage or discourage cross-border acquisitions. Various authors have argued that government-induced distortions can contribute to increasing after-tax returns to FDI (such as preferential tax treatment for foreign investors in specific industries, or the use of foreign plants for transfer pricing), thereby creating conditions under which it is more profitable to produce in, rather than export to, a foreign country. Thus, observed trends in FDI are explained by changes in these regulations, such as the rules on the repatriation of earnings and legal reforms that provide a clearer definition of property rights. As surveyed by Caves (1993), econometric work and case studies provide evidence that trade restrictions in the United States have boosted FDI from Japan. It may also have encouraged FDI in Asia so as to build "export platforms" for the U.S. market.¹⁰ In particular, voluntary export restraints in the automobile sector and the 1986 semiconductor trade agreement are shown to have induced sizable direct investment flows from Japan. Evidence on Japanese FDI to the European Union, however, has been less clear-cut (Thomsen, 1993, Barrell and Pain, 1993, and Nicolaides and Thomsen, 1991).

¹⁰Kawai and Urata (1997) discuss evidence of "export platforms."

While empirical support for a link between FDI and economies of scale due to the ownership of knowledge and policy-induced distortions is ample, these theories offer little insight into the cyclical volatility of FDI, nor can they adequately explain differences in FDI across countries that exhibit similar characteristics. For instance, foreign acquisitions in the United States fell by 60 percent in 1983, before more than doubling between 1986 and 1988, only to fall again by 30 percent between 1988 and 1990. The volatility of FDI around its historical trend is simply too large to be explained by slow-moving structural factors. To explain these fluctuations, it is necessary to appeal to cyclical factors that affect returns and costs to investment, such as exchange rates.

Studies examining the macroeconomic effects of exchange rates on FDI have generally adopted a partial equilibrium approach, focusing on the effects of exogenous shifts in the real exchange rate on FDI flows. Most attention has centered on the positive effect of an exchange rate depreciation of the host country on FDI inflows, because it lowers the cost of production and investment in host countries relative to the cost in source countries, raising the profitability of foreign direct investment. The wealth effect is another channel through which a depreciation of the real exchange rate could raise FDI. By raising the relative wealth of foreign firms, a depreciation of the real exchange rate could make it easier for those firms to use retained profits to finance investment abroad (see Froot and Stein, 1991, and Klein and Rosengren, 1994).¹¹ Numerous empirical studies have supported the link between exchange rate depreciation and FDI (Cushman, 1985 and 1987, Caves and Mehra, 1988, Culem, 1988, Froot and Stein, 1991, Goldberg and Klein, 1996, Klein and Rosengren, 1994, and Ito and others, 1996).

Like its theoretical counterpart, empirical work has tended to focus either on underlying factors that explain the location of FDI flows across countries (such as Kawai, 1994, and Kawai and Urata, 1995) or on explaining the cyclical behavior of FDI flows using macroeconomic variables (for example, Goldberg and Klein, 1996). Given our interest in analyzing the cyclical volatility of FDI and its impact on trade flows, this paper adopts the second approach, focusing on how macroeconomic variables can explain recent trends in Japanese outward FDI and trade. As we use bilateral data, however, the analysis does provide some information on the degree to which these macroeconomic factors may differ across countries, and, in particular, whether the behavior with respect to Japan's East Asian trade partners differs from that with industrial countries. No attempt, however, is made to explain the initial allocation of FDI flows across countries, which is presumably largely determined by underlying microeconomic factors.

¹¹Froot and Stein (1991) also argue that the appreciation of the yen in the late 1980s enabled Japanese firms, whose book values rose compared with those of foreign companies, to collateralize assets to finance new investment more easily than could their competitors in countries with depreciated currencies.

IV. THEORETICAL CONSIDERATIONS

Given the wide range of potential motives for FDI in foreign countries, it would be difficult to provide a single model covering all possible circumstances. This section therefore specifies a framework that focuses on the key macroeconomic differences between two motives for FDI: relocating parts of the production process to take advantage of comparative advantage across different countries, and relocating the entire production process to supply a local market more efficiently. These two motives provide a useful dichotomy both because the implications for underlying economic relationships are generally quite different, and because the first motivation (vertical integration of the production process) is often believed to underlie much of Japan's recent outward FDI, while the second motive is often argued to be more typical of FDI by the United States and other industrial countries.

Consider a representative firm located in Japan with production facilities both at home and at a foreign subsidiary, whose outputs depends upon local inputs of labor and capital. Labor is immobile across countries, and hence wage costs can vary by location. Capital, by contrast, is mobile within the firm, so that the real interest rate for the firm is the same in Japan and the foreign country, although other components of the cost of capital (prices for investment goods, tax rates, etc.) can vary by location. For simplicity, it is assumed that all capital is raised in Japan. As FDI involves a flow of capital from the parent in Japan to the foreign subsidiary, it can be defined as an increase in the desired capital stock at that subsidiary. By considering the response of the desired capital stock in the foreign location to differing disturbances, therefore, one can analyze the response of FDI under alternative assumptions.

Consider, first, the case of vertical integration, in which the foreign subsidiary is one part of an overall production process. In the absence of changes in relative costs between the two locations, foreign output is a complement to domestic output, as both are used to generate the final product. Accordingly, FDI flows abroad will be closely connected to domestic investment in Japan, as an expansion of production of final goods will require parallel increases in productive capacity at home and abroad. By contrast, investment in the country where the foreign plant is located will be relatively unimportant in explaining FDI outflows, as the goods being produced abroad are not being sold in the local market. Foreign investment trends will matter, but only to the extent that they reflect high underlying rates of return to capital rather than short-term cyclical factors.

A very different set of relationships would be expected to be true if the foreign subsidiary is primarily aimed at serving the local market. In this case, FDI would be expected to be closely connected to investment in the foreign country, as the subsidiary is responding to the same underlying factors as other local producers. In this case, however, trends in investment in Japan should be largely irrelevant to FDI flows, as the behavior of the Japanese market is of little importance to the managers of the foreign plant.

This discussion assumes that relative costs do not change between the two locations. Changes in relative costs, particularly if they are thought to be long-term, will affect FDI in both cases.

If production is vertically integrated, it will change the division of tasks performed in Japan and abroad. If the subsidiary is serving the local market, lower costs make capital investment in the foreign location more attractive. In both cases, FDI flows are boosted by reductions in costs of the foreign plant.

Putting all of these factors together implies the following relationship between FDI outflows, real investment, and the real exchange rate:

$$FDI_i = f(I_{JA}(+ \text{ or } ?), I_i (? \text{ or } +), E_i (-)) \quad (1)$$

where FDI_i is the flow of FDI from Japan to country i , I_i (I_{JA}) is investment in country i (investment in Japan), and E_i is the real bilateral exchange rate between country i and Japan (measured so an appreciation raises E_i). The expected elasticities are positive or indeterminate on both types of investment (depending on the motive) and negative for the real exchange rate of country i . This specification has the advantage of simplicity. The disadvantage, however, is that it is a reduced-form relationship, so that the independent variables are themselves responding to deeper structural disturbances in the economic environment.¹²

The relationship between FDI and trade also varies by motive. If production is vertically integrated, increases in the stock of FDI will be associated with increases in imports, as part of the output from foreign plants is sent back to Japan. FDI outflows may produce a temporary increase in exports if the capital goods used in FDI are bought from Japan. Exports may also rise in the long run, depending upon whether the foreign plant uses Japanese components, but this increase will be smaller than the corresponding increase in imports. By contrast, if the subsidiary is serving the local market, the major long-run impact of FDI is likely to be on exports rather than imports. In this case, there would most likely be a reduction in Japanese exports, as the foreign plant substitutes for goods which are currently exported from Japan. To the extent that the new plant uses Japanese components, however, this effect could be reduced or, if the subsidiary is very successful, even reversed.

To summarize, if the foreign plant is a part of the overall production process, FDI should be closely connected to Japanese investment and respond weakly to foreign investment, while FDI itself should primarily affect imports. If the foreign plant is aimed at providing final goods for the foreign market, there should be a close correspondence to the behavior of foreign investment and little or no connection with Japanese investment, and FDI should be more closely associated with long-run changes in exports. In both cases, the real exchange rate will also affect FDI flows. These results come from a simple framework, comparing only two possible motivations, looking at the impact on a single representative firm, and assuming all capital is raised in Japan. At the same time, the differences in behavior which have been derived provide a useful framework within which to assess later empirical results.

¹²A more structural approach would involve jointly estimating models of FDI, domestic investment, and foreign investment as a function of these structural disturbances.

V. DETERMINANTS OF JAPANESE FDI

To test equation (1) empirically, real bilateral data on FDI outflows from Japan to 20 of her major trading partners were regressed on real investment in Japan, real investment in the recipient country, and on the real bilateral exchange rate. The individual series were combined into a single panel data set, thereby increasing the number of data points and the precision of parameter estimates, a particularly important consideration as the sample period covered only 14 years (1982–95). The appendix contains a description of the underlying data.

The estimating equation uses first differences of the dependent and independent variables. This is because a levels specification would imply separate constant terms (fixed effects) for each bilateral relationship. The results from fixed effects estimation are consistent only if the independent variables are strictly exogenous, that is, that they are uncorrelated with the error terms in all leads and lags.¹³ This is a particular problem when, as in this chapter, the number of individual series (20) is larger than the number of data points in each series (14). First differencing the equation, by eliminating the individual fixed effects, alleviates this statistical problem.¹⁴ Accordingly, the estimating regression was:

$$\begin{aligned}\Delta\log(\text{FDI}_i)_t = & \alpha + \beta_0\Delta\log(I_{JA})_t + \beta_1\Delta\log(I_{JA})_{t-1} \\ & + \gamma_0\Delta\log(I_i)_t + \gamma_1\Delta\log(I_i)_{t-1} \\ & + \eta_0\Delta\log(E_i)_t + \eta_1\Delta\log(E_i)_{t-1} \\ & + \zeta_1\Delta\log(\text{STOCK}_i)_{t-1}\end{aligned}\tag{2}$$

where STOCK_i is the stock of FDI in country i . As all of the variables are measured in logarithms, the estimated coefficients measure elasticities. Lagged values of investment, the

¹³See Keane and Runkle (1992).

¹⁴First differencing does, however, induce a negative first order moving average error. To ensure that the results are robust to alternative functional form, results from a number of specifications are reported, including regressions using levels and fixed effects.

exchange rate, and the stock of FDI¹⁵ were included in the regression to provide more flexible dynamic responses.¹⁶

Table 1 reports the results from the general regression involving all variables and lags, and from a model in which insignificant independent variables have been eliminated from the specification. As the results from the two regressions are similar, the discussion will focus on those from the more parsimonious model. The coefficient on Japanese fixed investment is large (the elasticity is around 3) and highly significant. Thus, a one percent increase in Japanese fixed investment is accompanied by a 3 percent rise in Japanese FDI, indicating that FDI outflows have been closely connected to the investment climate in Japan.¹⁷

The coefficient on the lagged value of foreign investment (in other words, investment in the recipient country) is also significant, and the estimated elasticity is close to, and insignificantly different from, one.¹⁸ The results suggest that Japanese FDI has mirrored more general trends in fixed investment. In particular, increases in Japanese FDI in Asia appear simply to reflect buoyant overall investment in the region.¹⁹

The coefficients on the current and lagged value of the bilateral real exchange rate both have the anticipated negative sign, with the contemporaneous coefficient being around -1 and the lagged term -0.85. As the FDI flows in the regression are measured in local currency terms, the contemporaneous coefficient of minus one indicates that FDI flows in yen are unaffected by current changes in the exchange rate, plausibly reflecting a lag between FDI decisions and

¹⁵FDI flows are highly volatile (the standard deviation of the growth of real FDI flows is over 100 percent per annum), plausibly reflecting the “lumpy” nature of many of the underlying projects, as exceptionally large flows of capital required to purchase firms or factories are often followed by smaller-than-average flows for a time. Including the lagged stock of FDI to the regression allows this pattern to be replicated, as large increases in the stock will reduce future FDI flows.

¹⁶The specification was limited to contemporaneous terms and first lags as more general regressions indicated no significant impact from longer lags of the independent variables.

¹⁷Note, however, that the estimation period is dominated by the Japanese “bubble economy” of the mid- to late-1980s and the subsequent collapse. The large changes in overall business sentiment generated by the bubble could be generating atypical FDI responses. Unfortunately, the limited sample period means that this hypothesis cannot be tested.

¹⁸The lag of a year between changes in foreign investment and Japanese FDI plausibly reflects delays in implementing FDI projects.

¹⁹FDI rose rapidly in East Asia (especially in the NIEs) between 1986–89 and continued at a high level in the ASEAN countries, while declining somewhat in the NIEs.

Table 1. Basic FDI Regression Results, 1983–95			
		General Regression	Specific Model
Japanese investment	Current	3.03 (1.16)**	3.07 (0.82)**
	Lagged	-0.05 (1.21)	
Foreign investment	Current	0.25 (0.44)	
	Lagged	0.81 (0.44)	0.92 (0.39)*
Bilateral exchange rate	Current	-0.99 (0.30)**	-0.98 (0.30)**
	Lagged	-0.84 (0.32)**	-0.85 (0.28)*
Lagged stock of FDI		-1.31 (0.30)**	-1.36 (0.28)**
Constant		0.06 (0.06)	0.07 (0.06)
R ²		0.17	0.17
F-test of equality of coefficients across countries		0.60	0.66
Note: One and two asterisks indicate the coefficient is significant at 5 and 1 percent levels, respectively.			

the flow of resources. Once the lagged impact of the real exchange rate is also included, however, there is a significant impact on flows in both local currency and yen. (The results imply that, after a year, a 1 percent real depreciation against the yen results in an increase in Japanese FDI flows of 1.85 percent in local currency and 0.85 percent in yen).

The coefficient on the lagged stock of FDI is negative and highly significant, indicating that exceptionally large increases in the stock of FDI are followed by a diminution in subsequent FDI flows. This stock adjustment process has implications for the long-run solution to the model. In long-run steady state, the rate of increase of flows of FDI will equal the growth of the stock of FDI. Given the estimated elasticity on the lagged stock of FDI of -1.36, this implies that the long-run elasticities for FDI are only around 42 percent of the estimated short-run elasticities.²⁰ The implied long-run coefficient on the real exchange rate is

²⁰ Assume the long-run rate of increase in FDI and the stock of FDI is z percent. The estimated
(continued...)

thus around minus 0.8, that on domestic investment is 1.3, and that on foreign investment is 0.4. Over long periods, therefore, FDI outflows in yen are largely independent of movements the yen's real value but rise faster than domestic investment.

The constant term in the regression is not significant. As the equation is estimated in first differences, this implies that there is no significant trend in real FDI flows over and above the joint impact of the independent variables. Apparently, autonomous trends are not an important factor in explaining Japanese FDI. The R^2 indicates that the independent variables explain 17 percent of the variation in the dependent variables, the relatively low figure presumably reflecting the high variability of the dependent variable and the use of a first difference specification.

Finally, an F-test indicates no significant difference in estimated coefficients across different countries (including the constant terms). In particular, this result provides no evidence that the behavior of FDI outflows to neighboring East Asian countries differ from those to North America and Europe.²¹ This is somewhat surprising given the rather different sectoral composition of FDI outflows to East Asia compared to North America and Europe. An interesting future project would be to see whether disaggregating the data on FDI outflows by sector would provide more evidence of geographic differences in behavior.

The results suggest that the main driving forces for Japanese FDI are domestic conditions and the exchange rate, but that the distribution of FDI has reflected the investment climate of recipient countries. They suggest that, after one year, a depreciation of the local currency by 6 percent would generate around a 10 percent increase in FDI, as would a 3½ percent increase in Japanese investment. Both of these accord with stylized facts about Japanese FDI. The importance of domestic conditions, holding the real exchange rate constant, is consistent with the notion that Japanese FDI is generally a complement to domestic production rather than a substitute for it. Put differently, Japanese FDI appears to be focused more on outsourcing than on providing an alternative location from which to supply foreign markets. The exchange rate results also conform with the stress put by most commentators on changes in the value of the yen in explaining the behavior of Japanese FDI. By contrast, these results

²⁰(...continued)

equation can be rewritten as $z = \beta(1/2.36)X$. The value $(1/2.36)$ is 0.42, hence the long-run coefficients are only 42 percent of their short-run values.

²¹The results reported in the text test for significant differences in coefficients across all economies, and thus could lack statistical power in differentiating between the behavior of East Asian economies and the rest of the sample. To test for this possibility we also ran regressions differentiating the coefficient estimates for the eight East Asian economies in the sample from those for the other 12 countries. The results (not reported for the sake of brevity) again indicated no significant difference in behavior between East Asia and the rest of the sample.

provide no evidence that flows to low-wage Asian countries behave differently from flows to high-wage North American and European locations.

Table 2 reports results from a number of alternative specifications as a check on the robustness of these results. It reports results from reestimating the model with a first order autocorrelation adjustment (to take account of the negative serial correlation caused by the first difference specification), using instrumental variables (to check for simultaneity bias),²² and of a levels regression with fixed effects (to ensure that use of a first difference specification is not dominating the results).²³ The estimated coefficients from these alternative specifications show no significant differences from the basic regression.²⁴

Table 3 examines the effect of using different data series on the regression. The first column uses an alternative series for the stock of FDI. Rather than summing past flows of FDI in dollars, as is done in the official data, the alternative series calculates the stock of FDI using a standard capital stock calculation on the flows of real FDI in local currency (the dependent variable in the regressions) with a discount rate of 5 percent per annum.²⁵ The second column of the table shows the results obtained by reverting to the official data for the stock of FDI, but subtracting Japanese FDI from the foreign fixed investment series. The initial regressions assumed that the Japanese FDI flows did not affect foreign investment, which is the case if FDI involves acquisition of existing capital. "Greenfield" FDI, however, will raise fixed investment in the recipient country, thereby creating a simultaneity bias between FDI flows and foreign fixed investment.²⁶ The alternative series show the results from making the opposite assumption, namely that Japanese FDI is all Greenfield investment. The third column shows the effect of including short-term real interest rate differentials between Japan and the recipient country in the regression, as a test of the potential influence of financial factors on

²²The instruments were country-specific constant terms and the first to third lags of the other independent variables except for the stock of FDI, where only the first lag was used due to an absence of past data. Instrumental variable regressions using second to fourth lags, which are another way of testing for the effects of the moving average error induced by first differencing, gave similar results but with much less precision.

²³These regressions also include a first order autocorrelation adjustment.

²⁴Similarly, regressions using weighted least squares and eliminating outlying observations (not reported for the sake of brevity) show no significant differences from the base case. Details of these regressions are available from the authors.

²⁵The stock in 1981 is taken from official estimates.

²⁶Froot (1991) discusses the relative importance of Greenfield investment and acquisition of existing businesses in Japanese FDI flows.

Table 2. FDI Regressions: Alternative Specifications				
		Autocorrelation Adjustment	Instrumental Variables	Levels Regression
Japanese investment		3.71 (0.72)**	3.88 (1.12)**	3.58 (0.71)**
Lagged foreign investment		0.96 (0.35)**	0.97 (0.42)*	0.66 (0.33)*
Bilateral exchange rate	Current	-0.91 (0.29)**	-1.47 (0.82)	-1.02 (0.32)**
	Lagged	-0.91 (0.28)**	-0.79 (0.31)**	-0.84 (0.31)**
Lagged stock of FDI		-1.18 (0.26)**	-1.34 (0.29)**	-0.73 (0.23)**
Constant		0.00 (0.05)	0.03 (0.08)	...
R ²		0.23	0.15	0.90
Rho		-0.23 (0.06)**	...	0.53 (0.06)**
Note: One and two asterisks indicate the coefficient is significant at 5 and 1 percent levels, respectively.				

FDI flows. Finally, the fourth column of Table 3 investigates the impact of using GDP as the measure of real activity rather than investment.

As was the case for Table 2, the results in Table 3 are generally similar to the base regressions, providing further evidence that the results are robust to alternative specifications and assumptions about the nature of the FDI flows. At the same time, two significant differences from the results in Table 1 are worth noting. The estimated elasticities on the real exchange rate are somewhat lower when the alternative measure of the stock of FDI is used, summing to -1.2 rather than -1.8, implying a more limited role for the real exchange rate in determining the path of real FDI, particularly in yen. Also, the estimated elasticities on real GDP are significantly higher than those on real investment. The elasticity on foreign real GDP is around 2½ while that on Japanese GDP is almost 8, presumably reflecting the lesser cyclical variability of GDP in comparison with investment. Using GDP as the activity variable thus tends to obscure the result that increases in Japanese FDI flows across countries have mirrored movements in foreign fixed investment.

Table 3. FDI Regressions: Alternative Independent Variables

		Alternative FDI Shock	Alternative Foreign Investment	Adding Real Interest Rate Differentials	Using Output Instead of Investment
Japanese investment		2.77 (0.93)**	3.87 (0.86)**	2.99 (0.82)**	7.64 (2.14)**
Lagged foreign investment		0.98 (0.40)*	0.93 (0.39)*	0.75 (0.40)	2.40 (1.08)*
Bilateral exchange rate	Current	-0.61 (0.30)*	-0.89 (0.31)**	-0.84 (0.31)**	-0.84 (0.29)**
	Lagged	-0.61 (0.29)*	-1.04 (0.30)**	-0.82 (0.29)**	-0.98 (0.29)**
Lagged stock of FDI		-1.69 (0.40)**	-1.51 (0.29)**	-1.43 (0.29)**	-1.46 (0.29)**
Real interest differential	Current	...	...	0.05 (0.66)	...
	Lagged	...	...	-1.08 (0.65)	...
Constant		0.14 (0.06)*	0.03 (0.06)	0.03 (0.06)	-0.13 (0.09)
R ²		0.12	0.19	0.18	0.16
Note: One and two asterisks indicate the coefficient is significant at 5 and 1 percent levels, respectively.					

VI. FDI AND JAPANESE TRADE PATTERNS

FDI outflows from Japan imply a movement of production capacity away from Japan to other countries, a structural change that is often linked to recent changes in the pattern of Japanese trade. Most commentators have argued that the shift of production overseas has stimulated imports from overseas affiliates, particularly the share of manufactured goods in total imports.²⁷ The potential relationship between FDI and exports is more complex. Most would agree that FDI causes a temporary increase in Japanese exports, as new facilities set up by Japanese firms are often equipped using capital goods from Japan. Once production overseas

²⁷While such a relocation of production capacity may have reduced Japanese imports of raw materials, reflecting the substitution of domestic production by overseas production, this effect is likely to be small.

is on track, components may still be exported. On the other hand, the finished products that were once exported from Japan could be substituted for by overseas production. It is therefore difficult to determine a priori whether FDI results in a long-term rise or fall in total exports. The impact of FDI on the export structure is more clear-cut, however, with exports of capital and intermediate goods rising and exports of consumer goods declining. And, of course, the exports of those firms located abroad would increase as production increased.

The relationship between FDI and trade is examined using bilateral trade data for the same set of countries considered in the earlier analysis. The standard approach to estimating trade volumes for industrial countries is to assume that goods are differentiated by country of origin and that supply is perfectly elastic.²⁸ The volume of exports (imports) are thus determined by the underlying demand functions, so that trade flows are related to aggregate demand in the foreign (home) market and to relative prices between the export and import markets. We take this underlying specification and include both the stock and flow of FDI funds from Japan to assess the impact of FDI on Japanese trade flows. The size and significance of the coefficient on the stock of FDI is then used as a measure of the long-term impact of FDI on trade, while the coefficients on the flows of FDI are used to measure more temporary trade effects. This implies the following specifications for export and import volumes:

$$\begin{aligned}\text{EXPORTS} &= X(Y_i, E_i, \text{FDI}_i, \text{STOCK}_i) \\ \text{IMPORTS} &= M(Y_{JA}, E_i, \text{FDI}_i, \text{STOCK}_i)\end{aligned}\tag{3}$$

where Y_i (Y_{JA}) is real output in country i (real output in Japan).²⁹

As for the earlier regressions, the panel regressions were estimated using first differences to avoid potential misspecification. The estimating equation for exports was:

$$\begin{aligned}\Delta \text{EXP}_{it} &= \alpha + \beta_0 \Delta Y_{it} + \beta_1 \Delta Y_{it-1} + \beta_2 \Delta Y_{it-2} \\ &\quad + \gamma_0 \Delta E_{it} + \gamma_1 \Delta E_{it-1} + \gamma_2 \Delta E_{it-2} \\ &\quad + \zeta_1 \Delta \text{FDI}_{it-1} + \delta_1 \Delta \text{STOCK}_{it-1} + \delta_2 \Delta \text{STOCK}_{it-2}.\end{aligned}\tag{4}$$

The stock and flow of FDI were added only in lagged form as the data cover fiscal years which run from April of that year to the end of March of the following year. Accordingly, inclusion of contemporaneous values would involve data which included future actions. Due to lags, the regression was run over the 1985–95 period, implying 209 observations. All variables are measured in logarithms.

²⁸Goldstein and Khan (1983).

²⁹The appendix contains a description of the underlying data.

Table 4 reports the results from this general regression, a specific regression in which insignificant variables were eliminated from the specification, another specific regression using the alternative series for the stock of FDI discussed earlier, and from a levels regression using fixed effects and a first order autocorrelation adjustment. As far as output is concerned, all of the regressions show results which are typical for standard export equations. Increases in foreign output raise exports considerably on impact (the short-run elasticity is almost three), although this effect is tempered somewhat over time—the long-run elasticity is generally about half of the short-run value. Also as expected, appreciations of the local currency against the yen boost exports, and in this case the elasticity increases over time. However, the elasticities are lower than is typical in the literature. This may well reflect the use of aggregate price deflators to calculate real bilateral trade flows, which will tend to bias the estimated elasticities downwards in the face of pricing-to-market behavior by exporters.³⁰

The three regressions using the official series for the stock of FDI tell the same story about the relationship between FDI and exports, namely that FDI *flows* have a significant impact on exports (the estimated elasticity being 0.03–0.04), but that the *stock* of FDI has no significant effect. In other words, FDI has only a temporary impact on exports, consistent with the view that FDI influences exports largely through the short-term need to equip new factories. The results using the alternative series for the stock of FDI, however, shows a slightly different pattern. Flows of FDI have a similar impact in this regression as in those using the official stock, but in this regression the stock of FDI is also significant, attracting an elasticity of 0.15. Finally, as in the case of the FDI regressions, no evidence was found that parameters varied across countries, or East Asian economies as a group behaved differently from the other countries in the sample.

Table 5 reports the results from using a similar specification for imports (with Japanese GDP replacing foreign GDP). The main change in specification is that the estimation includes the contemporaneous value of the FDI stock (calculated as a weighted average of the current and past FY data to compensate for the difference in timing between the FDI and trade data), as the estimated elasticities on the lagged series for the stock and flow of FDI were consistently small and insignificant, and excludes the constant term.³¹ The results show a

³⁰See Bayoumi (1996) for a discussion of the effect of pricing-to-market behavior on bilateral trade equations and a review of existing evidence on pricing-to-market behavior. The downward bias in the estimated elasticities presumably explains why the sum of the estimated price elasticities on bilateral exports and imports are less than one, and hence fail the Marshall-Lerner condition.

³¹When a constant term was included in the regressions, the results showed a significant positive trend in imports together with negative long-run output elasticities, possibly reflecting the short time period used for estimation. In addition, while the coefficient on the behavioral terms were found to be equal across countries, the restriction that the constant terms were

(continued...)

Table 4. Export Regressions, 1985-95

		General Regression	Specific Regression	Alternative FDI	Levels ARI
Foreign output	Lag 0	2.85 (0.31)**	2.76 (0.26)**	2.83 (0.26)**	2.46 (0.39)**
	Lag 1	-0.13 (0.36)			0.19 (0.43)
	Lag 2	-1.36 (0.31)**	-1.39 (0.26)**	-1.4 (0.26)**	-1.40 (0.35)**
Exchange rate	Lag 0	0.34 (0.06)**	0.34 (0.06)**	0.3 (0.06)**	0.44 (0.06)**
	Lag 1	0.19 (0.07)**	0.19 (0.06)**	0.16 (0.06)**	0.22 (0.07)**
	Lag 2	0.00 (0.07)			0.03 (0.07)
Stock of FDI	Lag 1	0.00 (0.08)			-0.06 (0.08)
	Lag 2	0.04 (0.07)		0.15 (0.7)*	-0.00 (0.07)
Flow of FDI	Lag 1	0.03 (0.02)*	0.03 (0.01)*	0.04 (0.01)**	0.04 (0.02)*
Constant		0.01 (0.02)	0.01 (0.01)	-0.01 (0.02)	...
R ²		0.48	0.46	0.47	0.93
F test of parameter equality		1.16	1.20	1.18	...
Rho		...	...	...	0.70

Note: One and two asterisks indicate the coefficient is significant at 5 and 1 percent levels, respectively.

³¹(...continued)

equal was rejected. The fixed effects model (which has individual constant terms for each country) had the same problem with regard to output elasticities. The elimination of the constant terms generated more conventional results for the output elasticities, and is the formulation reported in Table 5.

highly significant elasticity on the real stock of FDI. The three regressions using the official definition of the stock of FDI produce an elasticity of around 0.25.³² Again, the elasticities showed no significant variation by country or between East Asia and the rest of the sample.

Table 5. Import Regressions, 1985–95					
		General Regression	Specific Regression	Alternative FDI	Levels Regression AR1
Japanese output	Lag 0	1.52 (.83)	0.47 (.38)	1.30 (.81)	0.34 (.83)
	Lag 1	-0.74 (.94)		-0.99 (.92)	-1.46 (.86)
	Lag 2	-0.15 (.63)		-0.43 (.62)	-2.55 (.69)
Exchange rate	Lag 0	-0.13 (.07)		-0.21 (.07)**	0.02 (.09)
	Lag 1	-0.16 (.07)*	-0.19 (.07)**	-0.13 (.07)	-0.04 (.08)
	Lag 2	-0.17 (.08)*	-0.22 (.07)**	-0.12 (.07)	-0.10 (.08)*
Stock of FDI		0.23 (.09)**	0.27 (.08)**	0.42 (.10)**	0.24 (.08)**
R ²		0.12	0.10	0.16	0.86
F-test of parameter capacity		0.91	1.22	1.26	...
Rho		...	...	...	0.89 (.03)**
Note: One and two asterisks indicate the coefficient is significant at 5 and 1 percent levels, respectively.					

Simulations using this estimate of $\frac{1}{4}$ as the elasticity of imports with respect to the stock of FDI indicate that, by 1995, increases in FDI stocks since 1990 may have raised Japanese merchandise imports from the 20 countries in the sample by about 10 percent, from an estimated ¥18.7 trillion without the additional FDI to its actual value of ¥20.8 trillion. (The only country whose imports from Japan are estimated to have fallen over the 1990s is Belgium, where the stock of real Japanese FDI is also estimated to have fallen.)

³²Similar results are generated whether the regression excludes the constant term (as reported in Table 5), includes a single constant, or has fixed effects.

Regressions using the alternative series for the stock of FDI produced a higher estimate of the elasticity, on the order of 0.42. The net impact of the stock of FDI on trade, however, is very similar whichever definition of FDI is used, as the alternative series for the stock of FDI also produces a significant impact from the stock of FDI on exports. The difference between the export and import elasticities using the alternative series is very similar to the elasticity on imports alone using the official figures.

These results are broadly consistent with earlier empirical work. For example, Kawai (1994) and Kawai and Urata (1995) find a close correspondence between FDI and trade using a gravity model specification on cross-sectional data.³³ Also, Chadha (1996) reports that a standard trade model under predicts import volumes over the recent past, particularly for manufactured goods, a result he interprets as reflecting structural changes, including the relocation of Japanese manufacturing facilities abroad.

VII. CONCLUSIONS

The last decade has witnessed a boom in outbound Japanese FDI. As outflows have exceeded inflows by an order of magnitude, the debate on FDI in Japan has centered on the implications of increasing FDI outflows for the Japanese economy, both in terms of the “hollowing out” of domestic manufacturing and its impact trade patterns. To help shed some light on these issues, this paper uses bilateral data on FDI and trade between Japan and her major trading partners to look at the underlying determinants of outward FDI and the impact of such outflows on merchandise exports and imports.

The first part of the paper examined the determinants of FDI outflows to determine whether, in addition to the “natural” process of maturation of the economy, FDI can be explained by macroeconomic factors. The results suggest that it can. Aggregate FDI has been largely driven by investment in Japan and the exchange rate, while the geographic distribution of such investment has been influenced by economic conditions, in particular the investment climate, in recipient countries. The link with the real exchange rate has been well established, both in earlier empirical work and from more anecdotal evidence. The close relationship between domestic investment and outward FDI is of more interest, as it implies that FDI is a complement to, rather than a substitute for, domestic capital. In addition, contrary to popular belief, the results provide no evidence that FDI flows to low-wage East Asian countries behave differently from flows to high-wage North American and European locations.

We then examined the relationship between FDI outflows and Japanese trade patterns. In common with other studies, the results consistently showed a significant impact of FDI on trade. Estimation suggests that FDI has only a temporary impact on exports, consistent with

³³These studies find significant effects of FDI on both exports and imports. They also find evidence that trade affects FDI, an issue which is not examined in this paper.

the view that FDI influences exports largely through the short-term need to equip new factories, rather than through the need to continually export components to overseas production facilities. Further, in line with our priors that the shift of production overseas has stimulated imports from overseas affiliates, the results indicate that a higher stock of Japanese FDI has permanently affected imports. Indeed, the estimated parameters indicate that between 1990 and 1995 outward FDI may have increased merchandise imports by around 10 percent by 1995.

A plausible interpretation of both sets of results is that Japanese firms are diversifying the location of their production, moving those parts of their operations in which they are losing comparative advantage off-shore. While the recent depreciation of the yen is likely to temper such a relocation, Japanese FDI outflows are part of a difficult, but necessary, restructuring of the Japanese economy, reflecting globalization and economic growth in the rest of Asia. Despite the pain involved, such a restructuring will produce a domestic economy better able to face the rigors of the world economy in years to come.

APPENDIX: DATA

There are two types of time series on FDI outflows from Japan. This study uses the Ministry of Finance (MOF) series based on prior notification, as required by the Foreign Trade and Foreign Exchange Control Law. The other series is published as part of the balance of payments (BoP) statistics. The main advantage of the MOF data is that they provide disaggregation both by country and by industrial sector, while the BoP data only reports aggregate flows. However, it is generally understood that the quality of the BoP series is better than the MOF equivalent.³⁴ The MOF data assume that notified investments are always implemented, and do not reflect depreciation or decumulation of capital stocks, firms' withdrawals from host countries, or bankruptcies. As a result, the MOF flows tend to be larger than those in the BoP figures, as can be seen in Chart 5. However, the two series move closely together—the contemporaneous correlation coefficient is 0.92—and there is no evidence that either series leads or lags the other.

The MOF data for the empirical work were obtained from the OECD, and updated by Japanese sources. It comprises FDI flows between Japan and 20 countries.³⁵ A point to note is that the data on stocks are simply a sum of past nominal dollar flows that take no account of the depreciation of the capital stock, inflation, movements in purchasing power parity between countries, the retained earnings of the concerned ventures or investment directly financed by affiliates overseas.³⁶ All of the data are reported on a fiscal year basis (April–March).

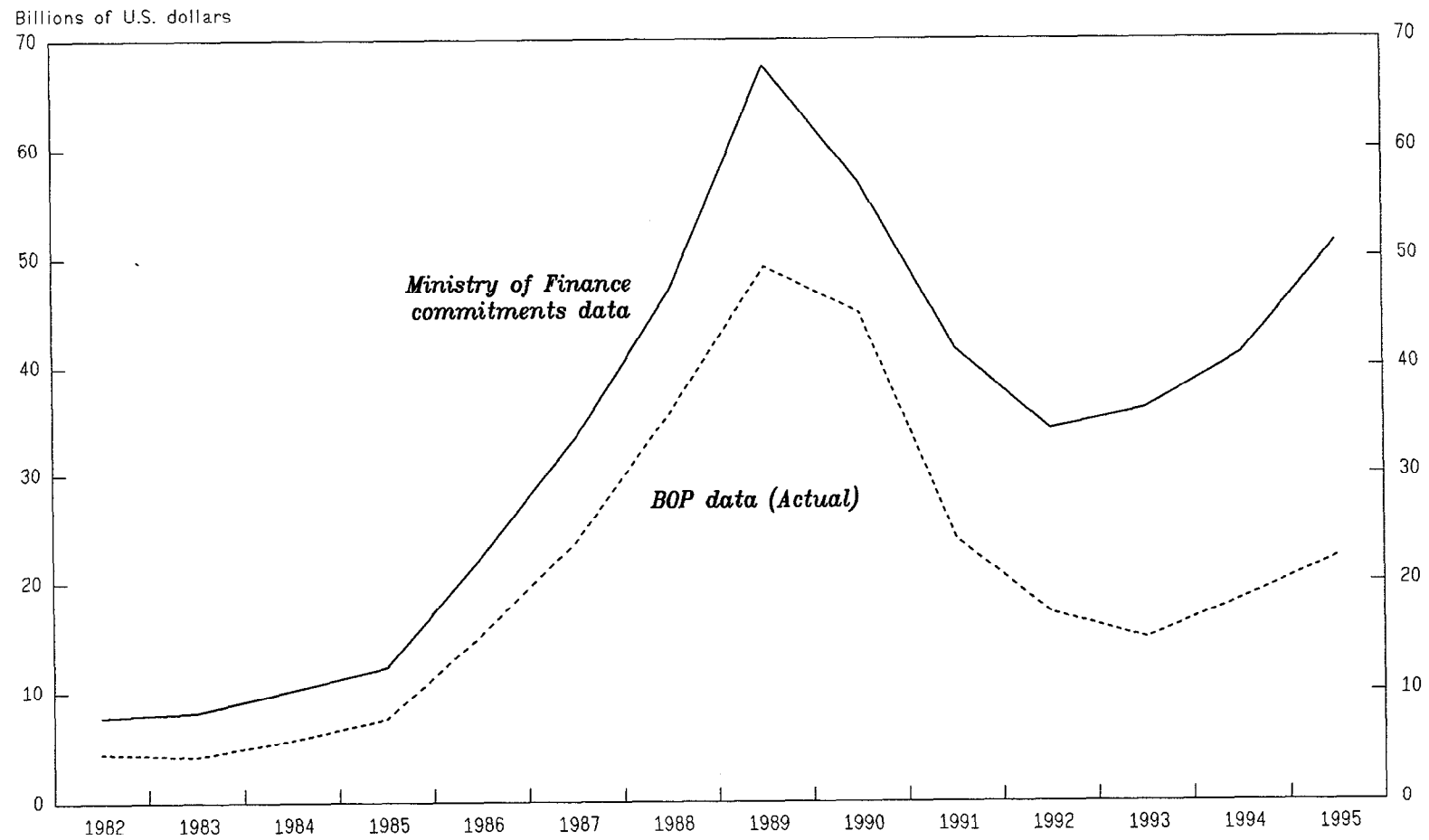
Calculating real outflows of FDI involves choosing a price deflator to convert the nominal outflows reported by the Japanese into their real equivalents. A complication with this calculation is that, while some proportion of FDI funds are almost certainly used to buy local goods, they may also be used to buy goods imported from Japan whose prices can move very differently due to exchange rate changes. In the absence of data on the types of goods which the FDI funds were used to purchase, the simplifying assumption was made that the FDI flows

³⁴Neither series includes retained earnings which are reinvested in host countries

³⁵The United States, Canada, Australia, France, Germany, Italy, the Netherlands, Belgium, New Zealand, Spain, United Kingdom, Hong Kong, Malaysia, the Philippines, Singapore, Taiwan Province of China, Thailand, Korea, India, Indonesia and Mexico.

³⁶Given that (1) accumulated investment stock is now large enough to produce sizable profits for reinvestment; and (2) overseas financing has eased in recent years, it is likely that the data underestimate Japanese FDI. For the purposes of this study, however, such a simplification may not be too disadvantageous as the focus is on the cyclical response of Japanese FDI to changes in activity and relative prices.

CHART 5
JAPAN
COMPARISON OF ALTERNATIVE DATA ON FDI OUTFLOWS, FY 1982-95



are used to buy local goods.³⁷ Accordingly, the nominal bilateral FDI flows in U.S. dollars reported by the Japanese were converted into the appropriate local currency and deflated by local prices.³⁸

The real bilateral exchange rate was calculated as the nominal bilateral rate with regard to the yen multiplied by the GDP deflator in the recipient country relative to that in Japan. (The GDP deflator was chosen as the price index as it is an easily available measure of relative costs across countries). Real investment in Japan and in the recipient country were calculated from the relevant nominal values.³⁹

Bilateral data on Japan's nominal merchandise exports and imports with the 20 countries in the data set were collected from *Direction of Trade Statistics* (DOTS). Calculating trade volumes from these nominal data requires export and import deflators. Unfortunately, while the DOTs data provide comprehensive data on bilateral nominal flows, no similar source is available for the corresponding bilateral deflators. Real export volumes from Japan were therefore calculated using the deflator for all Japanese exports, while import volumes were calculated using the appropriate export deflator for the country from which the goods originated.⁴⁰ Hence, export volumes from Japan to (say) Australia were calculated using the Japanese export deflator for all exports, while import volumes from Australia to Japan were

³⁷The dependent variable thus measures the amount of local investment goods that Japanese FDI outflows could purchase. To calculate the amount of Japanese goods the FDI could purchase, it would be necessary to adjust this estimate by the real exchange rate between the country in question and Japan. As the real bilateral exchange rate with Japan is included as an independent variable, it is possible that some of the estimated impact of the exchange rate actually reflects the use of FDI funds to purchase Japanese capital goods.

³⁸GDP deflators were used as investment deflators were not readily available from *International Financial Statistics*, the source for the main macroeconomic series used in the study. To further complicate things, this calculation also assumes that all currency transactions occurred at the time of investment. To the extent that the currency transactions were done at a different time, or were hedged, this may also cause a spurious correlation between the exchange rate and the measured level of capital flows. Note, however, that Japanese FDI flows are already measured in a third currency (U.S. dollars), which may tend to mitigate this statistical problems as the dollar values presumably reflect the impact of timing and of hedging activity.

³⁹Again using the GDP deflator.

⁴⁰The reason for using the export deflator of the country of origin rather than the Japanese import deflator is that the type of goods imported to Japan from different countries varies widely, making it inappropriate to assume that all of the goods are sold at the same price.

calculated using the Australian export deflator. The implicit assumption used is thus that countries sell their goods at the same price in all competitor markets.⁴¹

⁴¹Unfortunately, there is considerable evidence that countries do differentiate prices across different markets (Knetter, 1993). Note, however, that the equation also includes the real bilateral exchange rate so that the part of this “pricing to market” associated with movements in the bilateral exchange rate will be captured by this variable.

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