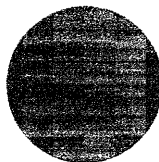# THE
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ON THE RELATIONSHIPS AMONG DIRECT
INVESTMENT AND INTERNATIONAL TRADE IN THE
MANUFACTURING SECTOR:
EMPIRICAL RESULTS FOR THE UNITED STATES AND
JAPAN

Edward Graham

MITJP 96-06

Center for International Studies
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On the Relationships Among Direct Investment and International Trade in the Manufacturing Sector: Empirical Results for the United States and Japan

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1. Introduction

This chapter presents empirical evidence bearing on whether outward foreign direct investment (FDI) and international trade are substitutes or complements, i.e., whether a greater stock of FDI held by a nation is associated with decreases or increases of its exports and imports.[1] This is an issue that has long concerned policymakers, who have worried about possible negative effects of outward FDI upon the nation's balance of payments and employment of its work force. In this chapter, results pertaining to two nations that are home to large stocks of FDI, the United States and Japan, are reported.

In principle, either relationship between FDI and exports could hold. FDI takes place when investors, usually multinational firms, based in one nation (the "home" nation) establish operations under their managerial control in some other nation (the "host" nation). Often, the motivation is to produce locally in the host nation products that had previously been exported from the home nation, and to the extent that this happens, FDI and home nation exports are substitutes. But also the home nation operations of a multinational firm can be vertically linked with host nation operations, such that an increase in the activity in the latter generates increased demand for intermediate products (including capital goods) from the former. Also, marketing and

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[1] In this investigation, it should be noted that the issue as described (whether FDI and trade are substitutes or complements) is more properly whether the output of affiliates of US firms created via FDI and trade are substitutes or complements; thus, the stock of FDI should be interpreted as a surrogate for this output.

distribution capabilities created by FDI might enable the home nation operations to export final goods and services to customers that would not be reached in the absence of FDI. To the extent that either of these happens, home country FDI and exports will be complements.

Because the value of intermediate products are components of the value added of final goods, it could be argued that FDI and exports must be net substitutes in some long run sense, i.e., that if exports of final goods from home nation are displaced by local production, there will be a net loss of export value even if the gross loss is offset in part by export of capital and intermediate goods. This is true in a trivial sense because the value of final goods must be greater than or equal to the value of all inputs used to produce those goods. However, this line of argument supposes that host nation demand for a particular good will always be fulfilled by exports from the home country, which might not be the case: Changes in the relative cost of production might imply that, with the passage of time, home nation exports will be displaced by local production irrespective of whether the displacement is done by multinational firms shifting production from the home to the host nation or by local firms operating entirely within the host nation.

Indeed, with the passage of time, the relationship between FDI and exports could very well change. If the host nation were to become over time relatively more efficient in the production of a particular class of final goods and the home nation were to become relatively more efficient in the production of intermediate goods used to produce these final goods, and if multinational firms were to hold specialized skills enabling the realization of internal economies associated with vertically linking the production of the two sets of goods, the relationship between additional FDI and exports by these firms could become increasingly complementary

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even if at some earlier point in history an initial FDI served to displace home country exports.

Even more complex relationships between FDI and international trade have been noted. Urata 1995 has examined the growth of the electronics industry in East Asia, and finds that direct investment and trade in electronics goods have grown hand-in-hand in the region. The electronics industry worldwide has been marked by rapid overall growth and by rapid rates of new product development and cost reduction. Urata finds that FDI by Japanese firms in the East Asian region has been driven both by growth of host nation demand and by complex patterns of shifting relative costs, causing firms to seek new production sites and to create complex patterns of cross hauling of both final goods and intermediate products. Urata notes that as these Japanese MNEs have, over time, placed new direct investments in countries where they were previously absent (for example China), these firms have not stopped nor even curtailed production in countries with older-vintage FDI.

A further reason for complementarity between international trade and activity of multinational firms is explored by Brainard 1995a, notably that multinational firms typically hold intellectual property advantages (e.g., technologies and trademarks) that might enable larger market shares and hence increase both trade and investment in markets where these firms operate. Brainard hypothesizes that the share of trade in total sales by a firm to a particular market will be negatively affected by transport costs and trade barriers, but positively affected by investment barriers and firm-level scale economies. Using US Commerce Department data for US direct investment abroad and foreign direct investment in the United States, she finds that trade and FDI barriers and scale economies are robust explanators, while transportation costs are not. In a related work, Brainard shows that relative factor proportions are not a robust explanator of

multinational firm activity (Brainard 1995b).

Whether FDI and exports are net substitutes or net complements thus is indeterminate on the basis of principles and, as a practical matter, the issue becomes an empirical one. Most studies of this relationship in fact tend to indicate that the relationship is complementary, that more FDI is associated with more, rather than less, exports.

In both the United States and in the United Kingdom during the late 1960s, for example, there was official concern over the effects of outward FDI on the overall balance of payments on a current account basis. Central to this concern was the question of the impact of outward FDI on trade flows. In response, two studies of these effects were carried out under official auspices (Reddaway *et al.* 1967 and Hufbauer and Adler 1968). These remain among the best empirical studies of the effects of FDI.

Using somewhat different methodologies and coverage, both studies arrived at roughly similar conclusions: If future cash flows are not discounted, the overall long term effects of outward FDI on the balance of payments are positive. That the effects of financial flows alone are positive should not be a surprise to anyone. This is because a firm undertakes an investment undertaking of any sort on the expectation that the investment will yield a positive return for the firm's shareholders, and ultimately that return must be reflected in dividend payments by the parent organization to those shareholders. Thus, to the extent that the shareholders of the firm are nationals of the home country, the returns accruing to the foreign affiliates of a firm must ultimately accrue to home country nationals funded through the parent organization.

However, both studies also indicated that outward FDI tended to stimulate exports (mostly of capital goods and intermediate goods) without stimulating imports in equal magnitude.

Later studies yielded results generally consistent with these findings. Bergsten, Horst, and Moran 1978, for example, found that the growth of US affiliates abroad had a significantly positive effect on the growth of exports of the US parent firms. Lipsey and Weiss 1981 also found that US outward FDI was associated with increased US exports, even after controlling for other effects (firm size, expenditures on R&D and marketing, etc.) but that the production of US affiliates abroad substituted for exports to the host country of third countries. In a later study, the same authors (Lipsey and Weiss 1984) analyzed unpublished US Commerce Department data at the level of the individual firm to examine foreign production and US exports in 14 industries in the manufacturing sector. They reported positive and significant relationships in 11 of these industries.

A study of the effects of offshore production of Swedish-owned firms upon the exports manufactured goods of the home country (Sweden) was published in 1988 by Blomström, Lipsey, and Kulchyck. Sweden is an advanced industrial economy located in close proximity to other advanced economies, and most of Sweden's direct investment is located either elsewhere in Western Europe or in North America. Blomström *et al.* found that increases in the production of affiliates of Swedish firms are positively related to increases in exports for the seven industrial categories studied. Also, they showed that there was no propensity for this positive relationship to change as the foreign production grew.

Pearce 1990, following an approach similar to that of Blomström *et al.*, examined the exports and foreign production of 458 of the world's largest industrial MNEs for the year 1982. His findings are that increases in foreign production are generally positively related to increases in exports. This was found to be especially true for intrafirm (as opposed to interfirm) exports,

underscoring the importance of vertical relationships among the various international affiliates of this sample of MNE's.

Buigues and Jacquemin 1996 examine the issue of complementarity versus substitution between FDI and exports with respect to both US and Japanese direct investment in the European Union. The basic assumption is that if share of the total exports from each of these countries going to the EU is positively related to the share of FDI going to the EU after controlling for three additional variables, the relationship is complementary. The three additional variables are: intra-EC nontariff trade barriers rate of growth of final demand, and the EC's sectoral specialization, all of which are assumed to be positively related to FDI. Buigues and Jacquemin's sample is pooled cross sectionally across seven industries (six for the United States) and ten years. They find the relationship between FDI and exports to be complementary for both the United States and Japan.

Industry Canada 1994 found that FDI from Canada is associated both with increases of Canada's exports and imports. The same finding is reported with respect to foreign direct investment in Canada. The findings are aggregate and (apparently) based on time series analysis. Estimates are made of the elasticities of exports and imports with respect to Canada's outward investment and the latter are higher than the former. These estimated elasticities of trade with respect to investment stocks (see Industry Canada 1994, Table 7) are not, however, controlled for the influence of factors such as economic activity, comparative costs, or other variables that could affect the outcomes.

Thus, all of the studies cited conclude that the relationship between FDI and exports is complementary. As is described in the next section, the results of empirical investigations of this

author point to a consistent result, but with some twists.

2. Empirical Results

Most of the studies cited above could be criticized for ignoring the possible effects of simultaneous determination of FDI and exports which could be causing a spurious correlation between these two and hence lead to an erroneous interpretation of complementarity.[2] This would be the case if both FDI and exports were responding to a common, unspecified causal element. For example, suppose that income or size of market alone determined both direct investment abroad and exports -- that is, both exporters and direct investors put their energies into developing large markets and/or those with high per capita incomes but ignored small and/or low per capita income markets.[3] Then simply to show that large share of exports was associated with markets where the share of direct investment was also large would not be sufficient to show that exports and direct investment abroad were complementary. They could still be substitutes once the effects of market size were taken into account.[4] Likewise, elements of simultaneous determination could distort results of studies based on differences across industries.

Thus, the effort was made in the results reported here to remove factors that might simultaneously determine exports and FDI and then to examine the relationship between these two latter variables with the source of the simultaneity bias removed. Specifically, a gravity

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[2]The major exception is Brainard 1995a, which is not an effort directly to test the complementarity/substitutability issue.

[3]Brainard 1995a in fact shows that high income levels in countries are associated with both increased multinational sales and increased trade.

[4]I.e., in any market, an increase in FDI could at the margin reduce US exports.

model was used first to estimate the effects of three variables deemed to be very important determinants of both FDI and exports. The three variables chosen were (1) per capita income in each host nation market (for which GDP per capita was used), (2) total size of this market (for which total population was used), and (3) distance from the host to the home country. The model was used to test determinants of FDI and exports for two home countries, the United States and Japan. The "distance" from the home country to the host country was, for the United States, the great circle distance from Indianapolis (approximately the center of economic activity of the United States) to the host nation capital and, for Japan, from Tokyo to the capital[5]. The gravity specification was multiplicative, i.e., the assumed relationship was

$$y = \log(\alpha x_1^{\beta_1} x_2^{\beta_2} x_3^{\beta_3} \epsilon)$$

where y is the logarithm of the dependent variable (FDI or exports), the x_i are the three independent variables, and ϵ is an error term (assumed, as usual, to be log-normally distributed with mean 1). The expected signs of β_1 and β_2 are positive (both home nation exports and FDI would be expected to positive functions of per capita income and market size); the expected sign of β_3 is negative for exports (the further the market is from the home nation, the higher transport costs, and hence the less likely that firms would export from the home nation) but indeterminate for direct investment (for example, if direct investment were to be a substitute for exports, then

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[5]One problem arises with this last variable with respect to Canada and Mexico, because much commerce between the United States and each of these nations originates very close to the border and hence that the distance measure might overstate the effective distance; however, as reported later in the text, the variable did not appear significant with respect to the estimations for the North American nations.

arguably the substitution would be most likely in those markets for which transactions costs associated with exports were high, and the expected sign of $ß_3$ would be positive; but one can envisage circumstances where direct investment would occur in geographically proximate markets {see, e.g., Graham 1995}).

The residuals from each of the two estimations (exports and FDI as a function of the three variables) were then regressed upon one another. The presumption was that if the gravity models have succeeded in removing simultaneity bias, then any correlation of the residuals would reflect some other causal relationship between FDI and exports -- such as that due to sourcing substitution or to complementarities in production or distribution and marketing. A positive correlation coefficient would suggest complementarity and a negative coefficient substitutability.

Also performed were similar two stage analyses between imports and direct investment abroad.

2a. Results for the United States[6]

For the United States, the sample included 40 individual countries that were destinations of both US exports and US direct investment. These forty countries (listed in the appendix) accounted in 1991 for over 96% of the stock of US direct investment abroad and over 95% of US manufactured goods exports. The analyses were run for three different years (1991, 1988, and 1983), and the results were roughly consistent for each year. Only the results for 1991 are

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[6]The US results also appear in Edward M. Graham, "US Direct Investment Abroad and US Exports in the Manufacturing Sector: Some Empirical Results Based on Cross Sectional Analysis", in Peter J. Buckley and Jean-Louis Mucchielli, editors, Multinational Firms and International Relocation (Wokingham, England: Edward Elgar Publishing, 1996).

reported here. Separate analyses were performed using (1) the data for all forty countries (reported in the tables below as "World"), (2) only those countries located in Europe, (3) only those countries located in the western hemisphere, and (4) only those countries located in east Asia. It should be noted that some countries in the sample are not in any of Europe, the western hemisphere, or east Asia; thus the "World" sample contains more observations than the sum of those in each of the three identified regions.

Summary results of the gravity analyses are given in Table 1 below. As can be seen, the specification led to overall good fits for the whole sample ("World") and for the subsamples subsuming Europe and the western hemisphere: for all of these, the F-tests were significant at the 99+% confidence level, and the R^2's are all in excess of 50%. Thus, it would appear that the three independent variables -- income per capita, population, and distance -- "explain" fairly robustly cross-country patterns of US exports, imports, and outward direct investment in the manufacturing sector. The overall fit for the east Asian subsample is substantially less good than for the other two subsamples, with the fit being particularly poor for US imports, where the F-test is significant at only the 90% level and the R^2 statistic suggests that only 31% of the total variance of the dependent variable is "explained" by the three independent variables. For US exports and US direct investment to Asia, the overall fit is better, but the F-test is still only significant at the 95% level and the R^2 statistics indicate that the relationships "explain" less than 50% of the total variance of the dependent variables.

The coefficients on the independent variables are mostly of the expected sign (recalling that the expected sign of the coefficient of the distance variable is indeterminate in the investment equation), but in many cases are not statistically significant. There are a few anomalies. The

Table 1: Gravity Model Results
US Data 1991

Dependent Variable	F-test	Coefficients of Independent Variables (standard error in parentheses)			R^2
		Income/cap	Population	Distance	
US Exports					
World	***	0.66 (.11)	0.11 (.10)	-0.38 (.22)	0.54
Europe	***	0.29 (.88)	0.60 (.64)	-1.56 (2.3)	0.63
W. Hemisphere	***	0.46 (.61)	0.41 (.42)	-0.98 (.31)	0.93
East Asia	**	0.89 (.50)	-0.23 (.46)	-0.77 (2.4)	0.40
US Imports					
World	***	0.94 (.08)	-0.00 (.07)	0.27 (.16)	0.80
Europe	***	0.82 (.15)	0.27 (.13)	-1.33 (1.2)	0.87
W. Hemisphere	***	1.15 (.20)	-0.24 (.19)	-0.14 (.26)	0.93
East Asia	*	0.53 (.26)	-0.07 (.14)	-0.61 (2.1)	0.31
US Direct Investment Abroad					
World	***	0.92 (.14)	0.17 (.13)	-0.77 (.29)	0.60
Europe	***	0.86 (.47)	0.80 (.39)	-9.57 (3.6)	0.66
W. Hemisphere	***	1.31 (.22)	0.10 (.20)	-0.31 (.28)	0.96
East Asia	**	0.93 (.30)	-0.15 (.16)	1.09 (2.5)	0.49

*** significant at 99+%
** significant at 95%
* significant at 90%

biggest of these is that the coefficient of the size of market variable (as measured by population) is often not of the expected sign but also is not significant (except for US direct investment in Europe, where the sign is as expected; see below). A second anomaly is that none of the coefficients of the independent variables for the US exports to Europe are significant, even though the overall relationship is. This suggests the possibility of multicollinearity among theindependent variables and hence that additional tests for joint significance of the three variables would be appropriate (e.g., calculation of joint confidence intervals for the variables taken two at a time).

It is perhaps noteworthy that the coefficient on the income per capita variable is highly significant for US imports with the expected (positive) sign for the "world" sample and for all three of the subsamples. Thus, *inter alia*, the "pauper labor" argument so often heard these days in the United States is not supported by this result. This is because US imports are associated with high income -- hence high wage -- source countries, not low wage countries.

Likewise, the coefficient for income per capita is highly significant for US direct investment abroad with the exception of Europe, suggesting that the "runaway plant" argument is not supported by the analysis. That Europe is an exception -- i.e., that for Europe the income per capita coefficient is not significant -- may be due to the fact that US firms have concentrated a disproportionate amount of direct investment in the United Kingdom, a country whose per capita income is not high relative to the rest of Europe. However, the UK per capita income is high by world standards and, hence, this concentration probably does not distort the results for the "world" sample. The variance in per capita incomes in Europe is in fact not as great as in the other regions, and perhaps this is the reason why for Europe alone market size appears to be a

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more important determinant of direct investment than does per capita income: most European nations are in the "advanced industrial" category and, given this, it would seem reasonable to expect that those nations with large populations would receive more US direct investment abroad in the manufacturing sector with nations with smaller populations.

It is worth noting that the first stage results were the most robust for the western hemisphere. For this subsample, the R^2 statistic was in excess of 0.9 for all three dependent variables, suggesting that over 90% of the variance in the dependent variables was "explained" by the independent variables.

.Table 2 gives the results of the second stage regressions. As can be seen, the relationship between the remaining unexplained variation in US outward direct investment in the manufacturing sector and the remaining unexplained variation in US exports of manufactured goods for the "world" sample was positive and significant at the 95% level. The relationship between these variables was also positive and significant for both the Europe and the east Asia subsamples, but it was negative and significant for the western hemisphere subsample. These results suggest that US outward direct investment and exports are complements globally and in the European and east Asian regions but that they are substitutes in the western hemisphere. This western hemisphere result is revisited shortly.

The results of second stage regressions of the relationship between US outward direct investment in the manufacturing sector and US imports of manufactured goods are also indicated in Table 2. The coefficient is positive but only significant at a 95% level for the world sample. The coefficients are not significant with respect to either the east Asian subsample nor the western hemisphere subsample, albeit that the signs of the coefficients are consistent with those

Table 2: Regressions of Residuals on Residuals of Gravity Equations
US Data 1991

US FDI and US Exports	Coefficient	Std Error	Significance
World	0.486	0.207	**
Europe	0.479	0.126	***
W. Hemisphere	-0.866	0.253	**
East Asia	0.524	0.228	**

US FDI and US Imports			
World	0.282	0.138	**
Europe	0.174	0.080	*
W. Hemisphere	-0.392	0.303	NS
East Asia	0.208	0.261	NS

*** significant at 99+% confidence level
** significant at 95% confidence level
* significant at 90% confidence level

reported for outward direct investment and exports just above. For theEuropean subsample the coefficient is positive and marginally significant. The residual relationship between FDI and imports thus is weak if there is one at all.

Why are the signs of the coefficients for the western hemisphere different than those of the remainder of the sample? The author's guess is that these results are a fallout of the importsubstitution policies that were pursued throughout much of Latin America during the 1970s and early 1980s whereby multinational corporations often were induced to establish local productionfacilities that would then operate behind protectionist walls and enjoy quasi-monopolistic status in the relevant market. Because such operations were frequently inefficient, most governments that pursued such policies have in recent years begun a process of policy reform (see, e.g., the various national studies in Williamson 1993). Nonetheless, the legacy of import substitution seems to have survived into the early 1990s. This possibility -- that the negative relationship between US direct investment and US exports in the western hemisphere is the legacy of import substitution programs -- is reinforced by the results of running the gravity model for the hemisphere with Canada removed from the subsample of countries. When this is done, the coefficient on the second stage regression for the direct investment abroad and US exports variables becomes greater in magnitude (but remains negative; it goes from -0.866 to -0.955) and becomes more significant (it now is significant at the 99%+ level of confidence).

Having noted this, however, it is important to note that the fact that the coefficient for the relationship between US outward direct investment and US imports for the western hemisphere subsample is negative and not significant. This result runs contrary to the often-made claim that multinational firms are transferring production to low wage areas south of the (US) border in

order to service the domestic US market. If this claim were true, one would expect that this coefficient would be positive and significant. Much the same statement can be made about east Asia. For this subsample the sign of the coefficient is positive (which, *ceteris paribus*, would support the transfer of production story) but it is not statistically significant.

What the results do seem to support is the following: that there is, overall, a positive relationship between US outward direct investment and US exports in the manufacturing sector. There is also weak evidence for a positive relationship between US outward direct investment and US imports in this sector. Thus, direct investment seems to be trade enhancing, but the story is much more one linking direct investment to exports than to imports.

2b. Results for Japan

The Japanese sample consisted of thirty six nations, listed in the appendix, accounting for all of Japan's reported stocks of outward direct investment in the manufacturing sector and about 90% of Japan's manufacturing exports. The two stage regressions were run on the sample as a whole and on partitions where the thirty six nations were partitioned into East Asia and non-East Asia. Australia and New Zealand were included in the East Asian subsample.

As can be seen in Table 3, the gravity model is quite robust in terms of its ability to explain both Japanese exports and imports of manufactured goods (as was the case for the United States). Unlike the case of the United States, the distance variable for Japan is a statistically significant explanator of exports and imports for the world and for non-East Asian nations (but not for the East Asian nations). The gravity model, for Japan, does not however appear very robust to explain outward direct investment.

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The second stage least square results for Japan are indicated in Table 4. With respect to the relationship between Japanese outward FDI and exports in the manufacturing sector, the sign of the coefficient is positive, consistent with complementarity between FDI and exports, and is significant for both the world sample and the non East Asia subsample. For the East Asia subsample, the sign is positive but the result is not statistically significant, a result addressed below.

For Japanese outward direct investment and imports in the manufacturing sector, the two stage model does not seem to offer robust explanatory power. The signs on all of the coefficients are positive as expected but none of these coefficients are statistically significant save for that for the world sample, which is significant only in the 90% confidence interval.

The lack of significance for Japanese outward FDI and exports for the East Asian nations is puzzling. This result, it would seem, is driven by the presence of Indonesia in the sample. Indonesia has long been a recipient of large amounts of Japanese direct investment in the manufacturing sector. As was the case for much US direct investment in the Western hemisphere, historically Japanese direct investment in Indonesia has been in response to import substitution policies.

Table 5 indicates both the first and second stage regression results for the East Asian sample without Indonesia. Without Indonesia, the gravity model remains robust to explain both exports and imports of manufactured goods and, in addition, it becomes robust to explain Japanese outward direct investment in the manufacturing sector. The second stage results become highly significant, with the coefficients on both Japanese outward FDI and exports and outward FDI and imports statistically significant. It would appear that in terms of relationships between

Table 3: Gravity Model Results
Japanese Data 1993

Dependent Variable	F-test	Coefficients of Independent Variables (standard error in parentheses)			R²
		Income/cap	Population	Distance	
Japanese Exports					
World	***	0.808 (.13)	0.62 (.13)	-1.39 (.29)	0.61
Non-East Asia	***	0.89 (.18)	0.88 (.18)	-0.37 (1.11)	0.69
East Asia	***	0.83 (.22)	0.42 (.21)	-0.98 (.41)	0.74
Japanese Imports					
World	***	1.09 (.16)	0.95 (.16)	-1.62 (.35)	0.67
Non-East Asia	***	1.45 (.16)	1.00 (.20)	-0.86 (1.28)	0.75
East Asia	*	1.04 (.33)	-0.90 (.07)	-1.02 (0.60)	0.67
Japanese Direct Investment Abroad					
World	*	0.48 (.20)	0.45 (.20)	0.01 (.45)	0.18
Non East Asia	**	0.66 (.34)	0.63 (.33)	3.44 (2.05)	0.41
East Asia		0.32 (.33)	0.31 (.47)	0.61 (1.02)	0.088

*** significant at 99+% confidence level
** significant at 95% confidence level
* significant at 90% confidence level

Table 4: Regressions of Residuals on Residuals of Gravity Equations
Japanese Data 1991

Japanese FDI and Exports	Coefficient	Std Error	Significance
World	0.97	0.20	***
Non East Asia	1.35	0.28	***
East Asia	0.31	0.39	NS
Japanese FDI and Imports			
World	0.37	0.21	*
Non East Asia	0.54	0.34	NS
East Asia	0.16	0.28	NS

*** significant at 99+% confidence level
** significant at 95% confidence level
* significant at 90% confidence level

Table 5: Gravity Model Results and Regressions of Residuals on Residuals, East Asian Sample Without Indonesia
Japanese Data 1993

Gravity Model

Dependent Variable	F-test	Coefficients of Independent Variables (standard error in parentheses)			R^2
		Income/cap	Population	Distance	
Japanese Exports	***	1.06 (.28)	0.47 (.22)	-0.45 (.55)	0.82
Japanese Imports	**	1.26 (.39)	0.87 (.31)	-0.41 (.75)	0.74
Japanese FDI	**	0.86 (.39)	0.42 (.31)	-0.44 (.75)	0.62

Residuals on Residuals of Gravity Equations

	Coefficient	Std Error	Significance
Japanese FDI and Exports	1.15	0.23	***
Japanese FDI and Imports	0.70	0.22	***

*** significant at 99+% confidence level
** significant at 95% confidence level
* significant at 90% confidence level

Japanese outward FDI and traded manufactured goods, Indonesia is an outlier of significant proportion.

. Exactly why Indonesia should be an outlier is not known for certain, but a likely hypothesis is virtually the same as for the anomalies reported in the analysis of the US data for the western hemisphere. This is that for a considerable period of time, Indonesia pursued importsubstitution policies, and Japanese firms responded to these by directly investing in the Indonesian economy to create affiliates that served the local market behind protectionist barriers. It must be emphasized, however, that as is the case for the western hemisphere, this explanation for the moment serves only as an hypothesis. Future work would seem to be indicated.

3. Conclusions

The empirical evidence presented in the previous section of this appendix is generally consistent with that of earlier studies reviewed in section 2. The evidence tends to support that US outward direct investment (or, more properly, the output of affiliates of US-based firms enabled by this investment) and US exports in manufacturing are complements and not substitutes. An exception may be the western hemisphere nations, which in this sample are predominantly developing or newly industrializing ones (with the exception of Canada). For the western hemisphere nations, the results of this study were inconclusive. The sign of the relevant coefficient from the gravity model specification was negative, consistent with a substitutive relationship, and was statistically significant at a 95% level of confidence but not at a 99% level. The same complementarity appears in the Japanese data; however, Indonesia would appear to be an outlier, in that robust results are obtained for relationships between Japanese outward FDI and

both exports and imports for the East Asian nations only if Indonesia is dropped from the sample.

To the extent that direct investment and exports indeed are complements, this result is not supportive of the claim that direct investment abroad is associated with loss of jobs or deindustrialization of the United States or Japan[7]. In particular, the analyses do not support contemporary variants of the "pauper labor" hypothesis (e.g., that multinational firms locate foreign direct investment primarily in nations where workers are highly productive but are paid low wages). The analysis presented here, consistent with Brainard 1995a, suggests that for FDI from both the United States and Japan, high per capita income is a drawing factor. This is true in spite of the fact that much FDI from both nations is located in the newly industrializing nations, where wages are significantly lower than in Japan or the United States.

More importantly, however, the complementarity between FDI and exports suggests that outward direct investment from neither country is associated with "hollowing out" or "deindustrialization", as is often claimed. Rather the opposite would appear to be true: that as direct investment abroad expands, the affiliates of both US and Japanese multinationals created by this investment acquire large appetites for goods produced in the home economies, and thus that expansion abroad is associated with increased, rather than decreased, export possibilities.

It is, however, also true that the same expansion abroad is associated, if more weakly, with increased imports of manufactured goods into the home economies. Are these expanded imports associated with job loss or deindustrialization?

This last issue cannot be answered on the basis of the evidence provided here. A

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[7]As is articulated by, among others, the US organized labor movement; Goldfinger 1971 remains one of the best statements of the attitude of organized labor toward international trade and investment.

reasonable (but, on the basis of the evidence here, untestable) hypothesis would be that the imports associated with multinational activity embody a higher percentage of unskilled or semiskilled labor, and a lower percentage of higher skilled labor, than do the associated exports. If this hypothesis is correct, the implication would be that expansion of multinational activity does put wage or unemployment pressure on low skilled labor in the home countries (the United States and Japan) but creates additional demand for high skilled labor. This in turn would cause the wages of the latter class of workers to rise relative to the former, and thus it is not out of the question that multinational activity has contributed to the growing disparities in income distribution observed to be occuring in the United States (but apparently not in Japan). However, this possiblity is conjectural and is not the only possible interpretation of the empirical results presented here. As is so often the case, it would appear that more research is necessary to test these propositions.

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