NBER WORKING PAPERS SERIES

FOREIGN DIRECT INVESTMENT IN THE U.S. AND U.S. TRADE

Robert E. Lipsey

Working Paper No. 3623

National Bureau of Economic Research
1050 Massachusetts Avenue
Cambridge, MA 02138
February 1991

NBER Working Paper #3623
February 1991

FOREIGN DIRECT INVESTMENT IN THE U.S. AND U.S. TRADE

ABSTRACT

Foreign-owned manufacturing firms' shares of U.S. trade grew from almost nothing in the 1960s to 7 or 8 per cent of trade in manufactured goods by the 1980s. It has changed little in the past decade, except for fluctuations related to changing U.S. exchange rates. Foreign-owned firms are less export-oriented than U.S. parent companies, overall and in the same industries, and more dependent on imports, relative to their sales.

The foreign affiliates' comparative advantage relative to U.S. parent firms and U.S. firms in general is concentrated in chemicals and metals industries. Foreign-owned firms in machinery and transport equipment do relatively little exporting from the U.S. in comparison with U.S.-owned firms.

The trade of the foreign-owned firms, as measured by exports/sales and imports/sales ratios and by export/import ratios, fluctuates more than that of U.S. firms. In particular, foreign affiliates seem to be more responsive than U.S. parents to exchange rate changes, shifting their production between sales in the U.S. and exports and their inputs between U.S. production and imports as the value of the dollar rises and falls.

Robert E. Lipsey
Queens College and
The Graduate Center, CUNY
Flushing, N.Y. 11367
and
National Bureau of Economic Research
269 Mercer Street
New York, N.Y. 10003

FOREIGN DIRECT INVESTMENT IN THE U.S. AND U.S. TRADE

Robert E. Lipsey*

The relationship between direct investment and trade has been a contentious issue in many countries for a long time. In the United States, most of the time, the typical worry has been that direct investment abroad by U.S. firms reduced output and employment at home. It might do this, supposedly, by substituting foreign production and employment for production and employment that would otherwise have taken place in the U.S. The production abroad might take the place of exports of goods from the United States or, even worse, might result in imports into the United States for consumption here in place of U.S. production. Similar worries were behind the Reddaway investigation on British foreign investment. (Reddaway, 1967 and 1968).

If the capital exporting countries were worrying about the loss of production and jobs at home, one might imagine that the capital importing countries were free of trade worries. However, they had a large set of contradictory fears about the effects of inward investment on trade. One was that the foreign-owned production would not substitute for imports, but would result in larger imports because foreign-owned firms imported more materials and components per unit of production than did domestically owned firms. Another trade worry, particularly in developing countries, has been that foreign investors exploited their host countries' natural resources

*I am indebted to Zhang Qing for statistical assistance and calculations and to James Hayes for preparation of the manuscript. A slightly different version will appear in The Annals of The American Academy of Political and Social Science, July, 1991, Vol. 516.

and exported natural resource products but paid too little for the privilege and denied the host countries the chance to move into the processing of their raw materials and other more complex stages of manufacturing.

Possible consequences of foreign investment

Now the United States has become a major recipient of direct foreign investment from abroad, and more of an importer than an exporter of direct investment. The fears about the outflow of U.S. investment, typical of the earlier period, have been muted, and much of the alarm in the United States about inward investment echoes the tone of earlier concerns in Canada, Australia, and developing countries about the effects of U.S. investment there.

Much of this discussion has been based, often implicitly, on vague notions of what constitutes the national interest and on very strong and sometimes naive assumptions about the alternative to the direct investment. In much of the earlier U.S. debate, for example, the implied assumption was that a U.S. firm had a choice as to whether to serve a foreign market by exporting to it or by producing there, and that each dollar of output it chose to produce abroad reduced its exports from the U.S. by a corresponding amount. The Reddaway report for the U.K., on the other hand, explicitly made the opposite assumption that any reduction of output by British firms in foreign countries would mean the loss of these sales by the firms and their replacement by foreign producers.

In the case of the United States, production here by foreign firms was at first encouraged by labor unions and others on the ground that it would reduce imports into the U.S. by a corresponding amount and employ American labor instead of foreign labor.

In the background there have always been commentators who have

pointed out how much the conclusions about trade effects of investment depend on the assumptions made about the alternatives. The Hufbauer-Adler (1968) report on U.S. investment abroad was the first to lay out the range of plausible assumptions about trade effect and to show how wide a range of possible conclusions could flow from them. The recent study of direct investment in the U.S. by Graham and Krugman (1989) disposes of the issue of effects on aggregate employment and the balance of payments by emphasizing that these are macroeconomic problems. In that case they must be addressed in terms of the level of U.S. saving and investment and of movements in the U.S. exchange rate that respond to changes in U.S. propensities to save, invest, and import.

The valid appeal to general equilibrium analysis for judging aggregate economic impacts, and the conclusion that they are not important, do not mean that there is no interest in the more partial analyses of effects on firms, industries, industrial sectors, and regions. For one thing, general equilibrium questions are answered by theoretical analysis, and it is rare that any empirical testing can be done. But the partial questions are also of great interest even if the aggregate effects are minimal.

Even for a firm or an industry, the problem remains of making some assumptions about what happens to variables other than those being studied. There are, in these calculations, always some assumptions of constancy in related variables that are questionable. It may be assumed, for example, that production in a country by a U.S. firm leaves the firm's total sales in that country unchanged and only represents a choice of methods of supplying a fixed share of a fixed market. Or it may be assumed that the U.S. firm's production may increase its share of the market in the host country by reducing the cost of supplying the product, without changing the demand for the firm's output. A still less restrictive assumption is that

production by the U.S. firm could increase the demand for that firm's product at the expense of local firms, for example by assuring customers of continuity of supply, but would not change the total demand for the product. And finally, it could be assumed that the U.S. firm's production could even change the aggregate demand for the product by altering tastes and introducing a greater variety of choices of buyers. The less restrictive the assumptions, the harder it is to calculate the effects of the U.S. firm's entry.

Similarly, much of the pressure on foreign auto firms to produce in the U.S. implicitly assumed that the foreign firms' share of the U.S. auto market was fixed and that production here would simply substitute U.S. output and U.S. labor for foreign labor and other inputs. As Japanese firms, in particular, began to produce in the United States, the issue shifted to whether production in the U.S. caused the foreign firms' shares to increase and whether the foreign firms' imports of parts and components were simply being substituted for previous imports of complete cars. Pressure then shifted to demands for more local (U.S.) content in the industry. The European Community, by proposing to include all Japanese companies' car sales under a quota, whether production takes place in Japan or in the EC, is, in effect, acknowledging that local production does not simply substitute for imports from the home country.

These analyses, in effect, assume that one can isolate the effect of a foreign investment or of a certain amount of foreign production, and then ask what would happen to trade if that quantity increased or decreased. The problem is that direct investment is one part of a whole web of relationships among imports, exports, market shares, and the sourcing of components and materials, all of which depend on the others. The mental experiment of changing one, holding all the others constant, may give little information about what does in fact take place when, for

example, foreign firms increase their levels of production or investment in a country.

We try here to trace the trade developments that have accompanied the recent growth of foreign direct investment in the United States. The method is descriptive, but we attempt to relate the changes in trade to other aspects of the growth in investment.

Recent trends in the role of foreign firms in U.S. trade

In 1988, the most recent year for which data are available, exports by foreign-owned manufacturing affiliates in the U.S. amounted to $21 billion, about 8 per cent of total U.S. exports of manufactured goods. Total exports by all foreign-owned affiliates were much larger, at $60 billion (U.S. Department of Commerce, 1990c). Most of the $39 billion in exports by affiliates outside manufacturing was by wholesale trade affiliates exporting non-manufactured products, particularly metals and minerals ($9 billion), and farm product materials ($12 billion). A very large part of these metals and minerals exports and almost half of the farm product exports were by Japanese trading companies, acting as intermediaries and not being to any large extent involved in the production of these goods. It seems unlikely that the direct investment in these activities alters the size or composition of trade substantially, and we therefore concentrate our analysis on manufacturing operations.

The share of foreign manufacturing affiliates in U.S. exports of manufactures rose from virtually nothing in 1966 to almost 8 per cent in 1982 and has changed little since then. It dipped slightly, perhaps to a little over 7 per cent when the exchange value of the U.S. dollar was high, but was probably back to 8 per cent by 1988 (Lipsey and Kravis, 1986, updated from Table 1 and Appendix Table A).

Foreign-owned manufacturing affiliates imported about $29 billion

into the United States in 1988, roughly a third more than the amount of their exports. Some of this consisted of raw materials but, to judge by a rough classification by type of product, most of the imports were of manufactured goods, partly components for further manufacturing, partly finished products for resale (U.S. Department of Commerce, 1990b, pp. 149, 151, and 153). The growth of the trade of foreign affiliates is shown in Table 1.

Table 1

Exports and Imports of Merchandise from and into the U.S. by U.S. Manufacturing Affiliates of Foreign Firms, 1977-1988 ($ billion)

	Exports	Imports	Exports/Imports
1977	3.6	5.6	64
1978	4.5	7.2	62
1979	6.5	8.7	75
1980	9.0	10.4	87
1981	13.6	13.2	103
1982	12.9	12.4	104
1983	12.0	14.0	86
1984	13.1	18.2	72
1985	12.8	18.6	69
1986	12.8	20.6	62
1987	14.9	23.4	64
1988	21.0	29.3	72

Source: U.S. Department of Commerce (1990b), (1990c), and earlier issues.

Over the decade, both imports and exports more than quadrupled, growing at almost the same rate. However the timing was very different, and the differences appear to reflect changes in the exchange value of the U.S. dollar. As the value of the dollar fell to a low point in 1980, exports rose rapidly until 1981, much faster than imports, and the ratio of exports to imports by foreign affiliates in the U.S. rose from 1977 to 1982. Then the dollar began the long and very large increase in value that reached its peak in early 1985. Exports stagnated until 1986, while imports rose more than 50 per cent and the ratio of exports to imports by

these affiliates fell by 40 per cent, to a low point in 1986. Starting in 1985, the value of the dollar declined again, and in 1987 and 1988 the value of exports grew much faster than the value of imports and the ratio of exports to imports rose. Thus it appears that foreign manufacturing affiliates are very sensitive to exchange rate changes in their operations, and respond sharply to increases and decreases in the value of the dollar, increasing their exporting and decreasing their importing when the dollar was cheap, and reversing the process when the dollar was expensive.

To some extent, these changes in the amounts of exports and imports reflect the growth of foreign-owned manufacturing in the United States, particularly in recent years. From being a country in which the book value of the stock of outward direct investment was over four times that of the stock of inward direct investment in 1966 and three times as large as late as 1977, the United States reached the point in 1988 where the book value of foreign direct investment in the U.S. considerably exceeded that of U.S. direct investment abroad. Although the book values almost certainly greatly understate the value of U.S. outward direct investment stocks, the direction of the change is quite clear. The foreign companies' shares of the assets of all U.S. corporations tripled in two decades and more than doubled in one, as did the share of foreign affiliates in total non-agricultural employment, although both shares were still far below 5 per cent in the mid 1980s.[1]

---

[1]Since the U.S. Department of Commerce defines foreign affiliates as any U.S. firm owned 10 per cent or more by foreigners, these ratios include important firms with relatively low foreign ownership. At least some of these firms are not really foreign-controlled, and in fact they include major U.S. owners of operations in other countries. The list of firms included in foreign direct investment in the U.S. is confidential, but the definition would appear to include DuPont as foreign-owned, a questionable classification, especially since the foreign owners are not a previously existing foreign firm. Thus, it seems very likely that these ratios are overstated.

The large jump in sales in 1981 suggests that DuPont did become

The growth in the sales of foreign-owned manufacturing affiliates in the U.S. is shown in Table 2.

Over the decade, the sales of foreign-owned firms in the U.S. more than quadrupled, as did their exports and imports. Thus the ratios of exports and imports to their total sales were about the same in 1987 as in 1977. However, as with the export/import ratio, the changes over time apparently reflected the affiliates' response to exchange rate developments (Table 3). As the dollar sank to the low point in its value, which it reached around 1980, the ratio of exports to sales of foreign owned

Table 2

Sales of U.S. Manufacturing Affiliates of Foreign Firms
($ billion)

1977	50.5
1978	62.9
1979	81.2
1980	98.2
1981	139.4
1982	141.5
1983	158.1
1984	176.4
1985	185.9
1986	190.6
1987	220.7
1988	268.6

Source: Same as preceding table.

---

part of this category then as the result of its acquisition of Conoco. That acquisition left a subsidiary of Seagram Co. Ltd. holding over 20 per cent of DuPont common stock. Of the jump of $41 billion in sales by foreign manufacturing affiliates, $22 billion were by affiliates of Canadian companies, and there was, at the same time, an increase of $25 billion in sales by affiliates in Industrial Chemicals. DuPont's sales in 1981, including Conoco for part of the year, were $23 billion (Moody's Investors Services, 1984, Vol. I, pp. 1305, 1308, and 1314).

Table 3

Exports and Imports by U.S. Manufacturing Affiliates of Foreign Firms as Per Cent of Sales

	Exports	Imports
1977	7.0	11.1
1978	7.2	11.4
1979	8.1	10.7
1980	9.2	10.6
1981	9.8	9.5
1982	9.1	8.8
1983	7.6	8.9
1984	7.4	10.3
1985	6.9	10.0
1986	6.7	10.8
1987	6.8	10.6
1988	7.8	10.9

Source: Same as preceding tables.

manufacturing firms rose, hitting a peak in 1981. At the same time, the ratio of imports to sales fell, reaching its low point in 1982. After 1980, as the dollar climbed toward its early 1985 peak, these firms reversed their trade patterns. The export ratio fell and the import ratio rose, through 1986. The plunge of the dollar's value after 1985 was then reflected in another partial reversal: the export ratio rose, but the import ratio, after declining in 1987, returned to the 1986 level or a little above it.

The annual fluctuations in the export and import propensities of foreign affiliates can be related to exchange rates in a more formal way by calculating regressions of exports/sales and imports/sales ratios against U.S. effective exchange rates. Several versions of such calculations for exports are shown in Appendix Tables B-1, B-2, B-3, and B-4. When the export ratios are correlated with contemporaneous effective exchange rates (Appendix Table B-1), very little relationship appears. However, the ratios are much more strongly correlated with exchange rates lagged one year (Appendix Table B-2), and the results show a significant negative

relation in almost all industries: when the exchange value of the dollar is high, the foreign affiliates' exports from the U.S. are low relative to their sales, and when the value of the dollar is low, the export ratio is higher. The relationship appears still stronger in most industries if a linear time trend is added to the equations (Appendix B-3), although the number of observations is sufficiently small to make one reluctant to add variables.

Changes in the export ratio are related to changes in exchange rates in Appendix Table B-4. Although most of the regressions are not statistically significant, the ones for two large groupings, all manufacturing and all machinery, do show a strong negative effect of rises in the value of the dollar on affiliates' export ratios, and the coefficients in the other equations are quite consistently negative.

Aggregate import ratios were relatively stable, as can be seen in Table 3, and we had relatively little success in explaining their movements by exchange rate changes. When no time trend terms were used in the equations, the very few significant coefficients showed a perverse relationship (Appendix Tables B-5, B-6, and B-8). Some of the equations with time trends (Appendix Table B-7) were statistically significant, and here positive coefficients for the exchange value of the dollar predominated among the coefficients with t-statistics above one, suggesting some effect of a high value of the dollar in promoting imports by foreign-owned affiliates in the U.S.

Foreign-owned firms and U.S. parent firms

One way to learn what role foreign-owned firms are playing in U.S. trade is to compare them with U.S. parent companies in the same industries. As can be seen in Table 4, the trade performance is different: foreign-owned firms tended to export less and to import more relative to their

Table 4

Exports and Imports as Per Cent of Sales
Foreign Affiliates in the U.S. and U.S. Parent Companies
in Manufacturing, by Industry, 1977, 1982, and 1988

	1977		1982		1988	
	Foreign Affiliates in the U.S.	U.S. Parent Companies	Foreign Affiliates in the U.S.	U.S. Parent Companies	Foreign Affiliates in the U.S.	U.S. Parent Companies
	Exports as Per Cent of Sales					
All Manufacturing	7.0	9.3	9.1	10.5	7.8	11.2
Foods	4.7	3.4	4.0	3.3	3.2	5.1
Chemicals	6.0	9.7	8.7	9.2	11.2	11.2
Metals	6.2	4.4	8.6	7.0	7.2	6.2
Non-elect. mach.	15.5	15.7	15.1	16.8	10.1	16.6
Elect. mach.	7.4	12.8	11.8	13.0	8.8	14.0
Transp equip.	9.0	12.5	15.7	15.6	7.2	15.5
Other mfg.	6.8	6.8	6.3	7.3	5.2	7.5
	Imports as Per Cent of Sales					
All Manufacturing	11.1	4.2	8.8	4.3	10.9	6.5
Foods	10.8	NA	9.7	2.7	5.3	2.4
Chemicals	6.0	2.9	5.1	2.7[a]	8.1	4.6
Metals	13.8	3.5	10.8	2.9[a]	12.7	5.3
Non-elect. mach.	18.6	NA	11.4	3.3	16.0	9.0
Elect. mach.	19.8	5.8	13.1	5.6	18.7	7.3
Transp. equip.	42.3	NA	18.6	7.7[a]	26.9	10.6
Other mfg.	9.0	2.7	7.8	2.7	8.1	4.2

[a]Imports from unaffiliated firms and majority-owned affiliates only.

Sources: U.S. Department of Commerce (1981), (1985a), (1985b), (1985c), (1990a), (1990b), and (1990c).

sales than U.S. parent companies in each of the three years. The margin was smaller with respect to exports and there were a number of industry groups in which the foreign-owned firms were, at times, more export-oriented than the U.S. parents; in 1982, for example, foreign-owned firms were more export-oriented than U.S. firms in three out of seven industry groups. On the import side, the foreign firms were more import-dependent than the U.S. parents in every industry in every year. Thus we can say that the foreign-owned firms were slightly more focussed on the U.S. market than U.S. parent firms were and were considerably more dependent on imports. That is not to say that the foreign firms were highly dependent on imports; the overall ratios of imports to sales were 11 per cent or less in these three years and reached above 15 per cent only in machinery and transport equipment. The highest import share, and the most controversial politically, was the 42 per cent in transport equipment in 1977, and that share fell considerably in later years.

Some of the difference in behavior between the foreign-owned and U.S. parent firms must reflect the fact that we are observing truncated versions of both sets of firms. The parent data include the central headquarters operations of the firms and the foreign affiliate data do not, except in the cases where the U.S. affiliate is controlled by foreigners but not by a foreign parent company. Both the parent and affiliate data are consolidated, but only within the United States. Thus, the U.S. parent data include production for export sale abroad, but not the sales operations themselves, because they are overseas. The foreign affiliate data include not only the production for sale in the U.S. but also the U.S. sales operations for their home production. That would tend to increase their apparent import propensities even if their production operations were no more dependent on imports than those of U.S. firms.

An indication that the stage of development of foreign affiliates may be a determinant of their import propensities is given by Equations 1 and 2. These relate the import propensities of foreign affiliates relative to U.S. parents in an industry to the size of the affiliates relative to the U.S. parents. The closer in size

(1) IMPPROP(AFF/PAR) = 4.63 - 9.90 AVSAL(AFF/PAR)
(5.48) (2.36)

(2) IMPPROP(AFF/PAR) = 4.73 - 11.80 AVEMP(AFF/PAR)
(5.6) (2.49)

Where IMPPROP(AFF/PAR) = Affiliate imports/sales ratio relative to U.S. parent imports/sales ratio.
AVSAL(AFF/PAR) = Average sales of affiliates relative to average sales of U.S. parents in an industry
AVEMP(AFA/PAR) = Average employment in affiliates relative to average employment of U.S. parents in an industry.

the foreign affiliates are to the U.S. parents in an industry, as measured by average sales or average employment, the closer their import ratios are. Unfortunately, the fact that some U.S. firms are counted as both U.S. parents and foreign-owned affiliates makes the finding ambiguous. We cannot be sure whether it reflects the effects of size, or that similarity in size reflects the presence of the identical firms in the two groups being compared.

Another distinctive characteristic of the foreign-owned firms, as compared with U.S. parents, was the volatility of both their export ratios and, to a lesser extent, their import ratios. The ranges in their export shares among the three years shown in the table were almost all at least twice as large as for U.S. parents. The comparison is more difficult to make on the import side because of missing data, but the relationship is similar where we can compare. The variations in the annual data for 1977 and 1982-88 point to the same conclusion. For the export/sales ratios, the average standard deviation (omitting overlapping industry categories) was

1.7 for foreign-owned affiliates and 1.1 for U.S. parents, while the average coefficient of variation was 22 per cent for the affiliates and 13 per cent for the parents (Appendix Table C-1). For import/sales ratios, the average standard deviation was 2.7 for foreign-owned affiliates and .9 for U.S. parents. The coefficient of variation, however, was slightly higher for U.S. parents, at 22 per cent, than for foreign-owned affiliates, because the mean import ratios were so low (Appendix Table C-2).

Comparative advantages of U.S. and foreign-owned firms

Another view of the role of foreign affiliates in the U.S. is given by the distribution of their sales and their exports across industries, as compared with that of U.S. parents and the U.S. as a whole. We can think of the distribution of sales and exports of U.S. parents as reflecting the comparative advantage of U.S. multinational firms combined with that of the United States as a site for production. The distributions of sales and exports of foreign affiliates in the U.S. reflect the same U.S. comparative advantage combined with that of the foreign multinationals, and the U.S. export distribution reflects the comparative advantage of the U.S. as a geographical area.

The most notable advantages of foreign firms are in metals and chemicals, which account for much more of their exports than of those of the U.S. or U.S. parents (Table 5). In both cases, we might speculate that the foreign firms are bringing into the U.S. some technology or access to foreign markets not available to U.S. firms, perhaps increasing U.S. export capabilities. On the other hand, non-electrical machinery and transport equipment account for much less of exports from the U.S. by foreign affiliates than of exports by the U.S. and by U.S. parents. These are presumably areas of comparative advantage for the U.S. (especially machinery) and for U.S. multinationals (especially transport equipment).

Table 5

Industry Distribution of Sales and Exports of Foreign Affiliates in the U.S. and U.S. Parent Firms, 1988, and of Exports by the U.S., 1986

	Foreign Affiliates in the U.S.		U.S. Parents		Exports, 1986	
	Sales	Exports	Sales	Exports	All Market Economies	U.S.
Manufacturing	100.0	100.0	100.0	100.0	100.0	100.0
Foods	11.2	4.7	12.7	5.8	8.7	6.4
Chemicals	28.3	40.5	14.9	14.8	11.6	13.0
Metals	13.4	12.5	6.6	3.6	9.8	5.1
Machinery	18.7	22.3	19.0	25.8	26.0	32.1
Non-elect.	7.6	9.8	9.7	14.3	14.8	20.6
Elect.	11.1	12.6	9.3	11.5	11.3	11.5
Transp. Equip.	3.8	3.7	26.0	36.0	17.9	24.6
Other Mfg.	24.6	16.3	20.8	13.9	26.0	18.8

Source: UN Trade Tapes; U.S. Department of Commerce (1990a) and (1990c).

In the case of transport equipment, the broadness of the industry classification conceals the fact that a large part of the U.S. comparative advantage is in aircraft while much of the foreign investment in the U.S. is in motor vehicles. In these industries, foreign firms may have some advantages to exploit, but do not seem to find the U.S. a particularly desirable place to produce for the world market. Some of this production in the U.S. may be substituting for imports from the foreign parents, and some may be serving to raise the foreign firms' shares of the U.S. market. In both foods and other manufacturing, the shares in sales are larger than those in exports for both foreign and U.S. firms, suggesting that the foreign investment in the U.S. is mainly for access to the U.S. market. These are industries in which trade ratios are relatively low; foreign investment in them probably has little effect on trade in either direction, but tends to increase the foreign firms' share of the U.S. market.

Summary and Conclusions

The major facts about the role of foreign-owned manufacturing firms in the U.S. are that their exports and imports both grew rapidly over the past decade, with exports reaching 8 per cent of the U.S. total in 1982 and remaining close to that level. The ratio of exports to imports for those firms was apparently sensitive to U.S. exchange rates. It rose as the exchange value of the dollar declined to its low point in 1980, and for a couple of years after that. It declined as, or soon after, the value of the dollar climbed, and then increased again as the value of the dollar fell after 1985. The range of the ratio was large, from exports less than two thirds of imports in the late 1970s and then again in 1986-87, to exports greater than imports in 1981-82.

Exports ranged from less than 7 per cent of the sales of foreign-owned manufacturing affiliates to almost a tenth, while imports ranged from a bit under 9 per cent to a little more than 11 per cent. Both shares responded as might be expected to exchange rates, exports falling and imports rising as the value of the dollar rose, and exports rising and imports declining when the dollar fell.

If we compare foreign-owned firms in the U.S. with U.S. parent companies, we find the foreign-owned firms somewhat less export-oriented, as measured by the ratio of exports to sales, and more dependent on imports. The lower export orientation is not as consistent as the higher import dependence; foreign firms imported more per unit of sales in every comparison.

Another way in which foreign-owned firms differed from U.S. parents is that their trade behavior fluctuated more. Their ratios of exports and imports to sales and their ratios of exports to imports varied over a wider range than those of U.S. parents and seemed more responsive to exchange rate developments.

The comparisons with U.S. parents may be affected by the fact that the foreign-owned firms are, typically, individual units of much larger enterprises, while the U.S. parents are the major portions of their firms. The average sales and assets of foreign-owned manufacturing firms were under $145 million in 1986, while the average U.S. parent had sales of over $1 billion and average assets of $1.2 billion. Thus, both their greater import dependence and the greater volatility in their trade behavior may reflect their size as much as their foreignness. Across industries, the larger foreign affiliates are relative to U.S. parents, the more similar is their degree of import dependence.

Another reason for differences in trading behavior between foreign-owned firms in the U.S. and U.S. parents is the difference in their age. There is considerable anecdotal evidence for a life cycle in the development of foreign affiliates in which they begin as essentially trading firms, importing almost all they sell, move on to local assembly, with lower, but still high, import content to their sales, and eventually graduate to largely independent manufacturing operations. This progression does not imply any absolute decline in importing, since part of the development involves an increase in market shares and size of operations, but it does involve a decline in the share of imports, that is, the ratio of imports to sales. While that sequence of events has often been described, it has not been demonstrated empirically that it is a universal or even a typical one. It has been shown that Swedish multinationals, as time passes since their entry into foreign production, tend to supply larger shares of their foreign markets by production in the host country rather than by exports. This fact suggests that foreign affiliates in the U.S. are likely to reduce the importance of imports as they mature, but it is certainly not conclusive evidence because the relationship between the progression for a multinational as a whole or for a country's

multinationals as a group does not necessarily reveal typical the course of development for a single affiliate or for affiliates in a given country. One of the few observations on that question is for a sample of apparently identical Swedish affiliates between 1965 and 1970 that found that they increased the ratio of imports from their parents to their sales over this period. That suggests that the decline in the ratio of parent exports to local production over time may partly reflect the shift of affiliates from sales to producing categories (Swedenborg, 1982, pp. 109 and 110, and Swedenborg, 1989). A later study finds that the passage of time produces increases in both exports to a country and production in the country by a Swedish multinational, but that the rate of growth of production is greater. Thus the ratio of local production to imports from the parent increases over time (Swedenborg, 1990, Tables 3 and 4).

Does it make any difference at all to the aggregate amount of U.S. exports and imports, the trade balance, or the composition of U.S. trade that foreign firms' direct investment in the United States has increased so rapidly and has become, in nominal terms, as large as, or larger than, U.S. direct investment abroad? Graham and Krugman (1989, pp. 49-50), take the view that the trade balance is determined by macroeconomic forces and not likely to be affected by the extent of foreign investment in the U.S. They suggest that the effect of the higher import propensity of foreign-owned firms, if it is real, might, at most, reduce the equilibrium exchange value of the dollar by 3 per cent and more likely reduce it by no more than 1 per cent (Ibid. pp. 56-58).

It is possible that the apparent difference in import propensities between foreign-owned and U.S. firms is mostly not real. It might be the effect of consolidating all U.S. operations of a foreign firm in the industry of greatest importance, which may mean that the firms listed as manufacturing include more wholesaling operations dealing with imports than

the typical U.S. manufacturing parent would have (Ibid. p. 56). On the other hand, some foreign manufacturing operations have probably been pushed into the wholesale trade category by the same procedure.

Another reason for doubting the reality of the difference is the fact that the great majority of foreign direct investments in the U.S. during the 1980s were for takeovers of existing U.S. firms, rather than for the establishment of new firms tied to their parents' operations, as is pointed out in a recent paper by Orr (1990). Furthermore, many of the investments are in industries in which trade in either direction has been of little importance.

The question of the permanence of the difference, if it is real, rather than statistical, is more complex. One can view the rapid growth of foreign direct investment in the U.S. as part of the long term move toward internationalization of production pioneered by American firms in earlier decades and now being imitated and followed by firms in other countries, such as Japan and Germany (Lipsey, 1989). The growth of foreign direct investment reflects both the increase in the competitiveness of foreign multinationals and their move toward internationalization. The increase in their competitiveness gives them the chance to sell in U.S. markets; their increasing internationalization involves supplying the U.S. market increasingly from production in the U.S. (and supplying other markets also from production in those markets). As the foreign-owned operations in the United States grow and mature, they are likely to become less and less dependent on their parents and more like their U.S.-owned counterparts, determining their export and import levels by changes in the competitiveness and comparative advantage of the U.S. as a production location.

Another basis for doubting any major effect on U.S. trade from the inflow of foreign direct investment is that studies of outward investment,

even on the individual firm level, do not show major effects on the trade of the home countries of multinationals. Studies for Sweden and the U.S., while they show more positive than negative effects on home-country exports, and presumably, therefore on host-country imports, also indicate that the effects are either not statistically significant or mixed in direction, and in any case are small relative to total trade (Swedenborg, 1979, and 1982; Swedenborg, Johansson-Grahn, and Kinnwall, 1988; Lipsey and Weiss, 1981 and 1984; and Blomström, Lipsey, and Kulchycky, 1988). Thus, while production abroad promotes exports from home countries more than it substitutes for exports (and therefore promotes imports into host countries more than it substitutes for such imports) the net effects are not of major importance, at least for the home countries, although they could be for small host countries. The comparative advantages of foreign affiliates in the U.S., relative to U.S. parent firms and U.S. firms in general, seem to be concentrated in chemicals and metals, the latter an area of comparative disadvantage for the U.S. and U.S. multinationals. In these industries, the foreign firms are probably bringing some technological or other firm-specific advantages to the U.S. and increasing U.S. international competitiveness. The foreign affiliates do not seem to have any comparative advantage relative to the U.S. or U.S. parents in non-electrical machinery, an area of comparative advantage for the U.S. and U.S. multinationals. These investments, as well as those in transport equipment may serve mainly as vehicles for foreign firms' access to U.S. markets, perhaps substituting for exports to the U.S. or as ways of holding on to U.S. markets first opened up by exports to the U.S.

A possible effect of foreign ownership on trade is a greater flexibility in determining where to produce for any particular market. The same phenomenon affects U.S. multinationals, in that they appear to shift production for export between parent and affiliate locations in response to

exchange rate fluctuations (Kravis and Lipsey, 1989). Foreign-owned firms may be more able to take advantage of, or offset, changes in exchange rates or in costs of production than are non-multinational U.S. firms. They may also be more flexible than U.S. parent firms in this respect, because they are less committed to production in the U.S. Thus, one result of the growth of foreign ownership in the U.S. (as well as of the internationalization of U.S. firms) may well be a greater sensitivity to exchange rate changes.

References

Blomström, Magnus, Robert E. Lipsey, and Irving B. Kravis (1988), "Multinational Firms and Manufactured Exports From Developing Countries," NBER Working Paper No. 2493, Cambridge, Mass.

Blomström, Magnus, Robert E. Lipsey, and Ksenia Kulchycky (1988), "U.S. and Swedish Direct Investment and Exports," in Robert E. Baldwin, Ed., Trade Policy Issues and Empirical Analysis, Chicago, University of Chicago Press, pp. 259-297.

Graham, Edward M., and Paul R. Krugman (1989), Foreign Direct Investment in the United States, Washington, D.C., Institute for International Economics.

Hufbauer, Gary C., and F. M. Adler (1968), Overseas Manufacturing Investment and the Balance of Payments, Tax Policy Research Study No. 1, Washington, D.C., U.S. Treasury Department.

Kravis, Irving B., and Robert E. Lipsey (1989), "Technological Characteristics of Industries and the Competitiveness of the U.S. and its Multinational Firms," NBER Working Paper No. 2933, Cambridge, Mass.

Lipsey, Robert E., and Merle Yahr Weiss (1981), "Foreign Production and Exports in Manufacturing Industries," Review of Economics and Statistics, Vol. LXIII, No. 4, November, pp. 488-494.

_____, and _____ (1984), "Foreign Production and Exports of Individual Firms," Review of Economics and Statistics, Vol. 66, No. 2, May, pp. 304-308.

Lipsey, Robert E. (1989), "The Internationalization of Production," NBER Working Paper No. 2923, Cambridge, Mass.

Lipsey, Robert E., and Irving B. Kravis (1986), "The Competitiveness and Comparative Advantage of U.S. Multinationals, 1957-1983," Cambridge, Mass., NBER Working Paper No. 2051, October.

Moody's Investor Services (1984), Moody's Industrial Manual, 1984.

Orr, James A. (1990), "Foreign Direct Investment in U.S. Manufacturing: Effects on the Trade Balance," Federal Reserve Bank of New York, Working Paper 9032, September.

Reddaway, W. B., in collaboration with J.O.N. Perkins, S. J. Potter, and C. T. Taylor (1967), Effects of U.K Direct Investment Overseas: An Interim Report, Cambridge, Cambridge University Department of Applied Economics, Occasional Paper 12.

Reddaway, W. B., in collaboration with S. J. Potter and C. T. Taylor (1968), Effects of U.K. Direct Investment Overseas: Final Report, Cambridge, Cambridge University Department of Applied Economics, Occasional Paper 15.

Republic of China (1989a), The Trade of China (Taiwan District: 1988, Taipei, Taiwan, Statistical Department, Inspectorate General of Customs, The Republic of China.

_____ (1989b), Statistical Yearbook of the Republic of China: 1989, Taipei, Taiwan, Directorate General of Budget, Accounting and Statistics, Executive Yuan, Republic of China.

Swedenborg, Birgitta, (1979), The Multinational Operations of Swedish Firms: An Analysis of Determinants and Effects, Stockholm, Industriens Utredningsinstitut.

Swedenborg, Birgitta,(1982), Svensk Industri i Utlandet: An Analys av Drivkrafter och Effekter, Stockholm, Industriens Utredningsinstitut.

_____ (1989), "R&D, Learning-by-Doing and the Multinational Growth of Swedish Firms," Working Paper No. 251, Stockholm, Industriens Utredningsinstitut.

_____ (1990), "The EC and the Locational Choices of Swedish Multinational Companies," Working Paper No. 284, Stockholm, Industriens Utredningsinstitut.

Swedenborg, Birgitta, Göran Johansson-Grahn, and Mats Kinnwall (1988), Den Svenska Industrins Utlandsinvesteringar, 1960-1986, Stockholm, Industriens Utredningsinstitut.

United Nations (1989), International Trade Statistics Yearbook: 1987, Vol. II, New York, United Nations.

_____ (1990a), Monthly Bulletin of Statistics, February 1990, New York, United Nations.

_____ (1990b), Monthly Bulletin of Statistics, May 1990, New York, United Nations.

U.S. Department of Commerce (1981), U.S. Direct Investment Abroad, 1977, Washington, D.C., 1981.

_____ (1985a), U.S. Direct Investment Abroad: 1982 Benchmark Survey Data, Washington, D.C.

_____ (1985b), Foreign Direct Investment in the U.S.: Operations of U.S. Affiliates, 1977-80, Washington, D.C.

_____ (1985c), Foreign Direct Investment in the U.S.: Operations of U.S. Affiliates of Foreign Companies: Revised 1982 Estimates, Washington, D.C.

_____ (1990a), U.S. Direct Investment

Abroad: Operations of U.S. Parent Companies and Their Foreign Affiliates, Preliminary 1988 Estimates, Washington, D.C.

_____ (1990b), Foreign Direct Investment in the United States: 1987 Benchmark Survey, Final Results, Washington, D.C.

_____ (1990c), Foreign Direct Investment in the U.S.: Operations of U.S. Affiliates of Foreign Companies, Preliminary 1988 Estimates, Washington, D.C.

Appendix Table A

U.S. Exports of Manufactured Goods, 1985-1988

	All Manufacturing Industries[a]		SITC 4-8[d]
	Complete Data[b]	Short-cut Method[c]	
1985	169,219	150,083	146,802
1986	176,556	154,472	149,911
1987		180,782	174,142
1988			216,300

[a]BEA definition, including manufactured foods, as used in U.S. Department of Commerce (1985).

[b]From UN World Trade tapes, adjusted for missing data and for understatement of U.S. exports to Canada, as discussed in Blomström, Kravis, and Lipsey (1988).

[c]An approximation to the complete data, calculated from United Nations (1989) and earlier issues.

[d]Calculated from data in United Nations (1990a) and (1990b).

Appendix Table B-1

Regressions Relating Export/Sales Ratios of
U.S. Manufacturing Affiliates of Foreign Firms
to Current Effective Exchange Rates, 1987-1988

	Constant	Effective Exchange Rate	$\bar{R}^2$
All Manufacturing	.094	-.146	-.020
	(5.2)	(0.9)	
Food & kindred prod.	.097	-.534	.393*
	(4.7)	(2.9)	
Chemicals & allied prods.	.074	.080	-.088
	(2.8)	(0.3)	
Industrial chem.	.093	.031	-.099
	(2.3)	(0.1)	
Drugs	.713	.030	-.098
	(2.8)	(0.1)	
Primary & fabric. metals	.083	-.148	-.040
	(3.9)	(0.8)	
Primary metals ind.	.069	-.005	-.100
	(2.7)	(0.0)	
Fabric metal prod.	.124	-.543	.178
	(3.8)	(1.8)	
Machinery	.130	-.144	-.081
	(3.4)	(0.4)	
Machinery, exc. elect.	.191	-.520	.018
	(3.7)	(1.1)	
Elect. & electronic equip.	.076	.189	-.055
	(2.4)	(0.7)	
Transportation equip.	.085	-.294	.176
	(4.8)	(1.8)	
Other manuf.	.144	-.240	-.082
	(2.2)	(0.4)	
Instruments	.107	-.085	-.088
	(3.8)	(0.3)	

Figures in parentheses are t-statistics

*Significant at 5 per cent level.

Appendix Table B-2

Regressions Relating Export/Sales Ratios of
U.S. Manufacturing Affiliates of Foreign Firms
to Lagged Effective Exchange Rates, 1977-1988

	Constant	Effective Exchange Rate	$\bar{R}^2$
All Manufacturing	.122	-.402	.471**
	(9.0)	(3.3)	
Food & kindred products	.111	-.655	.597**
	(6.3)	(4.2)	
Chemicals & allied products	.073	.085	-.088
	(2.6)	(0.3)	
Industrial chemicals	.086	.098	-.092
	(2.1)	(0.3)	
Drugs	.106	-.286	.059
	(4.3)	(1.3)	
Primary & fabricated metals	.112	-.411	.336*
	(6.3)	(2.6)	
Primary metals industries	.104	-.321	.096
	(4.3)	(1.5)	
Fabricated metal products	.139	-.672	.300*
	(4.5)	(2.4)	
Machinery	.188	-.678	.286*
	(5.8)	(2.3)	
Machinery except electrical	.259	-1.138	.431*
	(6.3)	(3.1)	
Electrical & electronic equipment	.123	-.244	-.030
	(3.8)	(0.8)	
Transportation equipment	.110	-.520	.712**
	(10.1)	(5.3)	
Other manufacturing	.221	-.944	.157
	(3.7)	(1.7)	
Instruments	.148	-.455	.217
	(5.9)	(2.0)	

Figures in parentheses are t-statistics

*Significant at 5 per cent level.
**Significant at 1 per cent level.

Appendix Table B-3

Regressions Relating Export/Sales Ratios of
U.S. Manufacturing Affiliates of Foreign Firms
to Time Trend and Effective Exchange Rates, 1977-1988

	Constant	Time[a]	Effective Exchange Rate[b]	$\bar{R}^2$
All Manufacturing	.109	.183	-.420	.416**
	(1.9)	(0.2)	(2.8)	
Food & kindred products	.282	-2.37	-4.29	.845**
	(6.6)	(4.1)	(3.8)	
Chemicals & allied products	-.246	4.43	-.339	.876**
	(6.6)	(8.9)	(3.5)	
Industrial chemicals	-.400	6.74	-.545	.922**
	(9.1)	(11.5)	(4.8)	
Drugs	.055	.701	-.353	-.015
	(0.61)	(0.5)	(1.3)	
Primary & fabricated metals	.072	.556	-.464	.288
	(1.0)	(0.6)	(2.4)	
Primary metals ind.	-3.36	1.49	-.463	.130
	(0.0)	(1.2)	(1.9)	
Fabric metal prod.	.266	-1.76	-.504	.310
	(2.2)	(1.1)	(1.6)	
Machinery	.380	-2.67	-.423	.398*
	(3.2)	(1.7)	(1.4)	
Machinery exc. elect.	.674	-5.76	-.588	.802**
	(7.0)	(4.4)	(2.3)	
Elect. & electronic equip.	.099	.339	-.277	-.140
	(0.7)	(0.2)	(0.8)	
Transportation equip.	.202	-.013	-.397	.840**
	(6.3)	(3.0)	(4.7)	
Other manufacturing	.387	-2.30	-.724	.112
	(1.6)	(0.7)	(1.1)	
Instruments & rel. prod.	.022	1.74	-.62	.278*
	(0.2)	(1.4)	(2.5)	

Figures in parentheses are t-statistics
*Significant at 5 per cent level
**Significant at 1 per cent level
[a]Year
[b]Lagged one year.

Appendix Table B-4

Regressions Relating Changes in Export/Sales of
U.S. Manufacturing Affiliates of Foreign Firms
to Changes in Effective Exchange Rates, 1977-1988

	Constant	Change in Effective Exchange Rate	$\bar{R}^2$
All Manufacturing	1.429	-3.82	.546**
	(12.2)	(3.6)	
Food & kindred products	1.757	-7.04	.286
	(5.1)	(2.2)	
Chemicals & allied products	1.316	-2.33	.120
	(7.9)	(1.5)	
Industrial chemicals	1.430	-3.22	.186
	(7.3)	(1.8)	
Drugs	1.390	-3.33	.090
	(5.3)	(1.4)	
Primary & fabricated metals	1.543	-4.70	.108
	(4.4)	(1.5)	
Primary metal industries	1.590	-4.90	.078
	(4.0)	(1.4)	
Fabricated metal products	1.037	.442	-.111
	(1.1)	(0.1)	
Machinery	1.434	-4.06	.309*
	(7.5)	(2.3)	
Machinery, exc. electric	1.322	-3.26	.262
	(7.8)	(2.1)	
Electric & electronic equipment	1.575	-5.01	.227
	(5.7)	(2.0)	
Transportation equipment	1.483	-4.55	.218
	(5.8)	(1.9)	
Other manufacturing	1.578	-5.26	.070
	(3.6)	(1.3)	
Instruments	1.561	-4.79	.191
	(5.4)	(1.8)	

For notes, see Appendix Table B-2.

Appendix Table B-5

Regressions Relating Import/Sales Ratios of
U.S. Manufacturing Affiliates of Foreign Firms
to Current Effective Exchange Rates, 1977-1988

	Constant	Effective Exchange Rate	$\bar{R}^2$
All Manufacturing	.127	-.224	.171
	(9.4)	(1.8)	
Food & kindred prod.	.091	-.025	-.099
	(2.9)	(0.1)	
Chemicals & allied prod.	.076	-.095	-.058
	(4.6)	(0.6)	
Industrial chemicals	.086	-.158	-.006
	(4.8)	(1.0)	
Drugs	.081	-.010	-.100
	(2.4)	(0.0)	
Primary & fabricated metals	.196	-.602	.436*
	(9.1)	(3.1)	
Primary metals ind.	.196	-.453	.162
	(7.0)	(1.8)	
Fabricated metal prod.	.203	-.105	.311*
	(4.3)	(2.4)	
Machinery	.196	-.265	-.039
	(5.2)	(0.8)	
Machinery, exc. elect.	.266	-.958	.222
	(5.1)	(2.0)	
Elect. & Electronic equip.	.146	.238	-.053
	(3.7)	(0.7)	
Transportation equip.	.097	-.155	-.027
	(4.8)	(0.8)	
Other manufacturing	.177	.143	-.099
	(1.0)	(0.1)	
Instruments	.140	.308	-.055
	(2.7)	(0.7)	

For notes, see Appendix Table B-2.

Appendix Table B-6

Regressions Relating Import/Sales Ratios of
U.S. Manufacturing Affiliates of Foreign Firms
to Lagged Effective Exchange Rates, 1977-1988

	Constant	Effective Exchange Rate	$\bar{R}^2$
All Manufacturing	.104	-.008	-.100
	(6.4)	(0.1)	
Food & kindred products	.117	-.265	-.010
	(3.8)	(0.9)	
Chemicals & allied products	.055	.099	-.058
	(3.2)	(0.6)	
Industrial chemicals	.068	.006	-.100
	(3.5)	(0.0)	
Drugs	.047	.300	.001
	(1.4)	(1.0)	
Primary & fabricated metals	.149	-.170	-.060
	(4.9)	(0.6)	
Primary metals industries	.138	.084	-.091
	(4.1)	(0.3)	
Fabricated metal products	.151	-.567	.012
	(2.6)	(1.1)	
Machinery	.130	.343	-.004
	(3.3)	(1.0)	
Machinery except electric	.150	.113	-.096
	(2.3)	(0.2)	
Electric & electronic equipment	.113	.535	.121
	(3.0)	(1.6)	
Transportation equipment	.119	-.359	.268
	(6.7)	(2.2)	
Other manufacturing	.131	.568	-.086
	(0.7)	(0.4)	
Instruments	.164	.079	-.097
	(3.0)	(0.2)	

For notes, see Appendix Table B-2.

Appendix Table B-7

Regressions Relating Import/Sales Ratios of
U.S. Manufacturing Affiliates of Foreign Firms
to Time Trend and Lagged Effective Exchange Rates

	Constant	Time[a]	Effective Exchange Rate	$\bar{R}^2$
All Manufacturing	.132	-.389	.029	-.197
	(2.0)	(0.4)	(0.2)	
Food & kindred prod.	.441	-4.50	.164	.710**
	(6.7)	(5.1)	(1.0)	
Chemicals & allied prod.	-.036	1.26	-.022	.044
	(0.6)	(1.4)	(0.1)	
Industrial chemicals	.003	.904	-.081	-.130
	(0.0)	(0.9)	(0.4)	
Drugs	-.308	4.92	-.170	.765**
	(4.9)	(5.8)	(1.0)	
Primary & fabricated metals	.225	-1.05	-.070	-.129
	(1.8)	(0.6)	(0.2)	
Primary metals ind.	.115	.315	.054	-.209
	(0.8)	(0.2)	(0.1)	
Fabric metal prod.	.389	-3.30	-2.52	.024
	(1.7)	(1.1)	(0.4)	
Machinery	.238	-1.50	.487	-.057
	(1.5)	(0.7)	(1.2)	
Machinery, exc. elect.	.208	-.803	.190	-.211
	(0.8)	(0.2)	(0.3)	
Elect. & electronic equip.	.235	-1.69	.697	.094
	(1.6)	(0.8)	(1.8)	
Transportation equip.	.181	-.861	-.277	.255
	(2.6)	(0.9)	(1.5)	
Other manufacturing	-.064	2.70	.311	-.197
	(0.1)	(0.3)	(0.2)	
Instruments	.788	-8.65	.905	.846**
	(9.7)	(7.9)	(4.2)	

[a]Year
*Significant at 5 per cent level.
**Significant at 1 per cent level.

Appendix Table B-8

Regressions Relating Changes Import/Sales Ratios
of U.S. Manufacturing Affiliates of Foreign Firms
to Changes in Effective Exchange Rates

	Constant	Change in Effective Exchange Rate	$\bar{R}^2$
All Manufacturing	.860	1.29	.019
	(6.6)	(1.1)	
Foods & kindred products	.926	.210	-.110
	(3.3)	(0.1)	
Chemicals & allied products	.836	.002	-.056
	(2.8)	(0.7)	
Industrial chemicals	.941	.967	-.103
	(2.3)	(0.3)	
Drugs	1.161	-.709	-.103
	(3.7)	(0.3)	
Primary & fabricated metals	.815	1.677	.001
	(4.4)	(1.0)	
Primary metals industries	.886	1.176	-.073
	(3.9)	(0.6)	
Fabricated metal products	.594	3.796	-.045
	(1.1)	(0.8)	
Machinery	.653	.316	.237
	(3.8)	(2.0)	
Machinery, exc. electric	.543	4.191	.170
	(2.1)	(1.7)	
Electric & electronic equipment	.770	2.177	-.041
	(2.5)	(0.8)	
Transportation equipment	1.171	-1.557	-.068
	(4.1)	(0.6)	
Other manufacturing	1.431	-3.250	-.090
	(1.7)	(0.4)	
Instruments	.756	1.801	-.010
	(3.6)	(0.9)	

Appendix Table C-1

Standard Deviations and Coefficients of
Variation for Export/Sales Ratios
U.S. Manufacturing Affiliates of Foreign Firms
and U.S. Manufacturing Parents
1977, 1982-88

	Standard Deviation		Coefficient of Variation	
	Foreign-Owned Affiliates	U.S. Parents	Foreign-Owned Affiliates	U.S. Parents
All Manufacturing	1.73	.72	21.2	7.5
Food & kindred products	1.99	.63	31.0	14.6
Chemical & allied products	1.55	1.00	21.1	10.8
Industrial chemicals	1.49	1.77	18.3	14.5
Drugs	1.19	1.12	17.4	14.0
Primary & fabric. metals	.97	.80	15.5	15.0
Primary metal ind.	1.29	1.24	19.0	22.3
Fabric. metal prod.	1.87	.76	31.6	15.9
Machinery	1.65	1.23	15.7	9.1
Mach., exc. electric	2.34	1.71	19.5	11.5
Elect. mach. & equip.	1.54	.91	16.5	7.4
Transport. equip.	2.40	1.26	23.2	9.2
Other manuf.	1.11	.63	22.7	9.6
Instruments	1.60	1.11	16.4	7.8
Average, omitting duplications[a]	1.69	1.11	22.1	13.2

[a]Omitting All manufacturing, Chemicals & allied products, Primary and fabricated metals, Machinery, and Instruments.

Appendix Table C-2

Standard Deviations and Coefficients of Variation for Import/Sales Ratios
U.S. Manufacturing Affiliates of Foreign Firms and
U.S. Manufacturing Parents
1977, 1982-88

	Standard Deviation		Coefficient of Variation	
	Foreign-Owned Affiliates	U.S. Parents	Foreign-Owned Affiliates	U.S. Parents
All Manufacturing	.86	.75	8.4	14.5
Food & kindred products	1.72	.14[a]	20.7	5.9[a]
Chemicals & applied prod.	1.04	.56[a]	15.8	15.4[a]
Industrial chemicals	1.04	1.16[a]	15.6	28.0[a]
Drugs	1.81	.81[b]	21.2	29.5[b]
Primary & fabricated metals	1.49	.73[a]	11.9	19.2[a]
Primary metals indust.	1.71	1.27[a]	12.0	28.8[a]
Fabricated metal prod.	3.53	.93[a]	41.3	37.6[a]
Machinery	2.11	1.27[a]	12.6	20.7[a]
Machinery, exc. elect.	3.51	2.06[a]	22.1	37.1[a]
Elect. & electronic equip.	2.11	.62	12.0	9.4
Transport equipment	8.11	.77[b]	34.7	8.0[b]
Other manufacturing	.75	.48[a]	10.0	14.4[a]
Instruments	3.15	1.13[c]	18.6	22.1[c]
Average, omitting duplications[d]	2.70	.92	21.1	22.1

[a]One year missing
[b]Two years missing
[c]Three years missing
[d]See f.n. a of Table C-1.

Appendix Table D

Exports by U.S. and All Market Economies
by Broad Industry Groups, 1986
(Unit: $ Million)

	All Market Economies	U.S.
All Manufacturing	1,508,926	176,558
Foods	131,695	11,289
Chemicals	174,472	23,007
Metals	148,228	9,049
Non-electrical machinery	222,636	36,395
Electrical machinery & equipment	170,113	20,243
Transport equipment	269,834	43,382
Other manufacturing	391,948	33,193

Source: UN World Trade Tapes, adjusted for missing data, for understatement of U.S. exports to Canada, and for the omission of exports by Taiwan, as discussed in Blomström, Kravis, and Lipsey (1988). Taiwan data are from Republic of China (1989a) and (1989b).