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ABSTRACT

Overseas production in a country by affiliates of Swedish and U.S. firms rarely appears to displace exports from the two home countries and in most cases either has no effect or tends to increase home country exports. The positive effect on Swedish exports is evident not only with respect to levels of exports to different countries at one time but also with respect to changes in exports over time. The positive effect on U.S. exports can be observed for minority-owned as well as majority-owned foreign operations.

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Introduction

The effect of foreign production by a country's firms on the home country's exports continues to be a puzzle after many years of controversy and a considerable amount of empirical research. Theoretical models of direct foreign investment typically treat the size of a market as exogenous and a company's share of a market as a function of its firm-specific capital. The decision as to whether to produce abroad is then a matter of choosing among possible methods of serving the foreign market, including exporting from the home country, producing abroad, and licensing others to produce the firm's product. That decision will depend on the nature of the firm's intangible assets, on transport costs, economies or diseconomies of scale, barriers to trade and other government regulations, on factor prices at home and in other countries, as well as on the need to adapt the product to differences among markets in the characteristics demanded. This more or less standard view of the multinational firm implies that production in a market is a substitute for production at home for export to that market.

A more neutral viewpoint would be to regard a firm's share of a market as being at least partly dependent on whether it produces there, even though local production does not affect the demand for the firm's products. That would be the case, for example, if a product were totally non-tradable: that may be true for some services, such as tourism or medical care. If all the firm's products were nontradable, there could, of course, be no effect of overseas production on exports. A more interesting example would be that of a

firm that can increase its market share in a country by producing there, because local production reduces the cost of supplying the market. If that local production requires some input from the parent, such as components, it might raise or lower parent exports, depending on the size of the gain in market share and the importance of parent input in the affiliate's output.

A third possibility is that foreign production increases host-country demand for the firm's products. In that case, higher foreign production would be more likely to lead to larger home-country exports. That is most easily seen if the foreign production is in trade and services ancillary to exporting, such as sales and service operations. It could also be the case for foreign production of one part of a parent company's range of products that familiarizes a market with the parent company's name and reputation. It would also be possible for foreign production to raise the demand for the product in general, rather than only the output of the producing firm. That might be the case, for example, if a company like Coca Cola enters a country and advertises heavily. The demand for cola drinks might increase enough to open the market to local or other foreign producers.

With all these possibilities, the assumption of fixed market shares for a parent firm, convenient though it is, seems inappropriate to us. Furthermore, even if a firm's overseas production added to exports by the parent, for one of the reasons mentioned above, that addition might be at the expense of exports by rival companies in the home country. For this reason we examine the effects of foreign production on a home country's exports rather than on the exports of the parents themselves.

We analyze the effects of foreign production on home country exports,

using cross-section data from Sweden and the United States. In addition, for Swedish exports, we also study the determinants of changes over time in exports to each destination.

Earlier Empirical Findings

Despite the implications of theoretical models of direct investment, empirical studies have rarely observed substitution between overseas production and exports. A cross-section study for 1970 covering 14 industries, based on foreign production data for about 200 of the larger U.S. investors, found only positive coefficients among those that were significant in equations in which U.S. exports to a country in an industry were related to U.S. companies' production in that country and industry as well as to other variables (Lipsey and Weiss, 1981). At the same time, coefficients for U.S. companies' production were mostly negative in equations explaining exports to each country by other industrial countries. There was weaker evidence, from data on numbers of affiliates, that investment by countries other than the U.S. was negatively related to U.S. exports, and positively related to exports by other countries. The positive (complementary) relationship between U.S.-owned production and U.S. exports was also evident in equations for individual U.S. firms' exports, based on the same data (Lipsey and Weiss, 1984).

Bergsten, Horst, and Moran (1978), using published IRS and U.S. Department of Commerce data, concluded that "... the relation between foreign investment and exports or imports is largely haphazard," (p. 97), although they suggested that there is a noticeable complementarity for investment up to a certain level, because most of the initial investment goes into marketing

and assembly.

The most elaborate examination of trade-investment relationships for individual firms has been performed by Swedenborg (1979) and (1982) for Swedish multinationals. OLS equations relating the ratio of exports to home production to the ratio of foreign to home production across all industries showed a positive and significant influence of foreign production on firm exports, and of foreign production in a country on firm exports to the country. A 2SLS estimate of the relationship found it not to be statistically significant, although the coefficients across all firms, and across all firms and countries, did not change greatly. As compared with those in the OLS equations, they fell by 25 to 30 per cent. Equations confined to firms with more than five affiliates produced lower coefficients in OLS equations, and more of a decline in 2SLS.

Swedenborg (1982) also combined data from four Swedish surveys, again using 2SLS and found that each increase of foreign production in a country by $10 produced an increase of exports to that country by the parent company of $1. That one dollar increase was the net outcome of $1.20 added to exports to the affiliate and .20 subtracted from exports to non-affiliates in the country.

Estimating the Effects of Foreign Production

The fear that foreign production by a country's firms means the export of jobs to other countries is an old one. Bergsten, Horst, and Moran (1978) trace the discussion in the U.S. back to the 1920's, despite the fact that much of the flow of U.S. investment at that time was in public utilities, not likely to be competitive with U.S. production.

While the idea of exporting jobs in the aggregate is a fuzzy one, and while economists have not generally considered the maximization of commodity exports to be a sensible objective for economic policy, these fears have led to recurrent efforts to measure the effect that U.S. firms' overseas production has on exports and to proposals for government action to hinder the growth of such production.

There are several possible ways of defining what is meant by the proposition that production overseas by a country's firms substitutes for, or is complementary to, exports by the country or by the parent firms themselves. Each of them is associated with a different implied model of the behavior of firms or a different policy question.

The simplest, if unrealistic, view might be that the factors determining the location and extent of affiliate production in a country are unrelated to the factors that determine parent exports to a country. This would be the case if affiliates were handed out to parents in a lottery. What might amount to much the same thing would be if the decision to establish an affiliate in a country were a very long-term one, and virtually permanent once made, while the export decision was a short-term one, easily adjusted to contemporary circumstances. Then, even if the existence and size of an affiliate reflected the same influences, such as exchange rates or price levels, that also played an important role in determining trade flows, the investment and the exports would reflect these influences from different periods. In that case, we could still interpret a coefficient for affiliate production, for example, in an equation explaining exports from the home country as representing the effect of affiliate production on exports.

The persistent problem in these analyses is the likelihood that the variables that determine investment in a country and affiliate production are the same as the ones determining trade flows. Some of the obvious ones, such as host country income and income per capita, can be included in the equation for trade flows to avoid attributing their effect to affiliate activity. However, the risk that always remains is that there are unaccounted-for variables--such as host country regulation--that influence both investment and trade, and that we attribute their effects to investment.

There have been various attempts to escape this problem. The most obvious way is to include all relevant explanatory variables in the trade equation, but one can never be sure that there are not important additional variables omitted. In studies of exports by Swedish multinationals, Swedenborg (1979 and 1982) used 2SLS, with the first stage equation estimating affiliate production and the second stage parent exports as a whole and parent exports to individual countries. The results were not very different quantitatively from the OLS results, but one difficulty was the fact that the first stage equation explained little of the variation in affiliate production. Consequently, a good deal of what may have been relevant variation in affiliate production was omitted in the second stage.

Lipsey and Weiss (1981 and 1984) attempted to escape the problem by including a larger number of variables in the OLS equations, by working within fairly detailed industries, and by examining the relationships of affiliate production, not only to home-country exports, but also to exports by others. The idea behind the last procedure was that it was likely to reveal some spurious relationships based on omitted characteristics of countries, provided

that they did not produce opposite effects on U.S. exports and exports by others.

Another method of dealing with the simultaneity issue, which we have tried in this paper, is to study changes over time in home-country exports to each destination, rather than the levels of exports. The assumption involved is that the effects of the most troublesome unaccounted-for factors that simultaneously influence investment and exports do not determine changes in these, or that their influence is incorporated in the initial levels of affiliate production and exports. We do not believe that such a cross-section of changes over time has been tried before.

Trade Equations

The equations explaining U.S. and Swedish exports for each industry group are related to the trade equations of the type discussed in Leamer and Stern (1970) and used in studies by Chenery (1960), Linneman (1966), and others. However, they do differ in a couple of respects. One is that they all relate to exports from one country and therefore do not involve any exporting country variables. A second is that we use GDP and GDP per capita rather than GDP and population (only two of the three, income, population, and income per capita can be used, because any two determine the third). A third difference is that we have dropped the distance variable, typically used as a measure of trade resistance, since it made little difference to the results and we needed to economize on independent variables. The implied trade equation for each industry is then:

$$EXP_{ij} = f(GDP_j, GDPC_j)$$

where

EXP_{ij} = Exports from the U.S. or Sweden to country j in products of industry i in 1982

GDP_j = Real GDP of country j in 1982 in international prices (see Appendix)

GDPCj = Real GDP per capita of country j in 1982 in international prices

We expect the coefficients for GDP to be positive, although one can imagine cases in which the expected influence of aggregate income on the aggregate demand for the product is more than offset by its influence on supply. That may be the case, for example, in an industry in which economies of scale are of great importance and large markets are the preferred locations for production, so that while overall demand in a country is high, import demand is low. Coefficients for GDPC may be either positive or negative and can be influenced by both demand-side and supply-side factors. Among the demand-side influences, a high income elasticity of demand should mean high demand in countries with high per capita income, given the aggregate GDP, and therefore a positive coefficient for GDPC. A low income elasticity should produce a negative coefficient. Among supply-side influences, if, for example, high income per capita were associated with high skill levels and, therefore, comparative advantage in skill-intensive products, import demand should be low and the coefficient negative. Obvious missing variables are tariff levels, for which we do not have

information for a sufficient number of countries, and restrictions on imports or inducements to exports by affiliates, which are possibilities for further research. There are no industry characteristics, such as appear in some other studies of this issue, because each equation includes data for only one industry group.

To these trade equations we add several variables representing affiliate activity or production. These are:

NS_{ij} = Net Sales of affiliates in industry i located in country j (Sales minus imports from the home country).

NLS_{ij} = Net Local Sales: Sales of affiliates in industry i located in country j minus the portion of these sales accounted for by imports. That amount is estimated assuming that the ratio of imports to sales is the same for sales in the host country as for sales to other countries.

NES_{ij} = Net Export Sales: Sales of affiliates in industry i located in country j to buyers outside country j, minus the portion of these sales accounted for by imports, estimated as for NLS.

We have no prior expectations for either Net Sales or Net Local Sales. They include a mixture of influences in opposite directions. To the extent that affiliate production substitutes for exports from the United States or Sweden by either the parents or other firms, the effect on exports should be negative. That would be true if affiliate production of finished pro-

ducts substituted for exports of finished products, but also even if affiliate assembly of products substituted for only the final stages of output, provided that the U.S. or Swedish companies' share in the country's consumption was a fixed amount determined by country size and other country variables. Even if production in a host country increased exports of components or of other finished products by the parent, the effect on home country exports as a whole could be negative if some production replaced export sales by other U.S. or Swedish companies.

On the other side, if production in a host country by a U.S. or Swedish company increased the size of that country's market for the products of that company's industry, or if it raised the company's share of the market even without increasing the size of the market, the effect on home-country exports would be positive, provided that the increase in share came at the expense of local or other foreign companies rather than of U.S. or Swedish companies. The positive effects could be on home-country exports of raw materials or components or on home-country exports of other finished products as local production familiarized the host country with the parent's brand name or with U.S. or Swedish goods more generally. The positive effect on home-country exports may be enhanced by the fact that some of the affiliate production, even in affiliates classified as manufacturing, consists of distribution and service activities.

As between Net Sales and Net Local Sales, we would expect negative coefficients to be more likely in the latter case. To the extent that affiliate production is for export rather than for local sale, it should not substitute for home-country exports to the host country, even if it competes with home-

country exports to other countries. Thus, we treat the production for export separately and expect the coefficient on Net Export Sales to be positive.

Effects of Swedish Affiliate Production

Our examination of the consequences of Swedish firms' overseas production is based on the same set of data on individual multinational firms as was used by Swedenborg (1982). However, it focuses on aggregate Swedish exports in each industry, including exports by non-multinational firms, rather than on exports by the parent firms themselves. The data cover 10 individual industries (see Appendix for a description of the data). We have used equations for only the 7 industries in which there are at least 10 countries with Swedish-owned production.

The impact on Swedish exports of overseas production by Swedish firms is described by the set of coefficients for affiliate production in equations explaining Swedish exports to a country by GDP and GDP per capita, as in the trade equations described above, but adding a variable for being a Nordic country (Denmark, Finland, and Norway). We also performed a 2SLS regression on the Swedish data where the first stage equations included a dummy variable for EEC membership. We expect the coefficients for GDP and GDP per capita as well as that for being a Nordic country to be positive (see Table 1).

Table 1

Coefficients[a] for Swedish Affiliate Net Sales in a Country in Equations Explaining Swedish Exports to the Country[b], 1978

Industry Group	OLS	2SLS
Paper Products	.229 (4.98)	.435 (4.09)
Chemicals	.836 (4.05)	3.511 (3.09)
Metal Mfg.	.379 (4.43)	.500 (4.34)
Non-Electrical Machinery	.359 (12.9)	.368 (9.05)
Electrical Machinery	.086 (1.40)	.516 (1.15)
Transport Equipment	.312 (3.49)	.921 (2.85)
Other Mfg.	1.137 (6.64)	2.490 (4.58)

[a] t-statistics in parentheses

[b] Equations include, as independent variables, GDP_j, $GDPC_j$, a dummy variable for being a Nordic country, and Swedish manufacturing affiliate net sales. The instrument variable in the 2SLS is a variable for EEC membership.

Source: Appendix Tables S-1 and S-2

In the OLS regressions, all the coefficients are positive, implying that, other things equal, greater production by Swedish affiliates in a country is associated with larger exports from Sweden. The range of coefficients is wide, from 230 Kroner of exports per thousand Kroner of production in the host country, to exports greater than the host-country production. There is no evidence here that host-country production substi-

tutes for exports from Sweden.

There is some suggestion in the results of unaccounted for curvilinearity in the relationship, in the fact that the intercepts, supposedly showing the exports that would take place without any Swedish-owned production in the country, are mostly negative and fairly large, although they are not statistically significant (see Appendix Table S-1).

The coefficients in the 2SLS regressions are in general much larger than those in the OLS equations, although the story they tell is similar. All the coefficients in the 2SLS analysis are positive, and two of them indicate that a Kronor of Swedish-owned production in a foreign country draws in more than a Kronor of Swedish exports.

We were able to distinguish affiliate production for local sale in the host country (Net Local Sales) for only five industries. The result of substituting net local sales for net sales in these five industries is shown in Table 2.

Table 2

Coefficients[a] for Swedish Affiliate Net Sales and Net Local Sales in a Country in Equations Explaining Swedish Exports to the Country, 1978

Industry group	Net Sales	Net Local Sales
Paper Products	.217 (2.11)	.351 (2.79)
Chemicals	.809 (2.29)	.870 (2.32)
Metal Mfg.	.330 (1.59)	.268 (.80)
Non-Elect. Machinery	.336 (5.87)	.508 (6.32)
Electrical Machinery	.083 (1.11)	.085 (1.12)

[a]t-statistics in parentheses

Source: Appendix Table S-3

The substitution produces larger coefficients for affiliate sales in most cases but only two of the differences are substantial.

On the whole, then, while we would hesitate to place great weight on the estimated size of the coefficients, we think the evidence for a positive relationship is reasonably strong. There is certainly no sign of any negative relationship in this cross-section.

Another way of looking at the relation between foreign production and exports is to relate changes in exports to a country in each industry group over a period to the initial levels of exports to and affiliate activity in that country and to changes in real income and affiliate activity. We estimated the following equations:

ΔEXP_{ij} = $f(\Delta GDP_j, EXP70_{ij}, NS70_{ij})$

and

ΔEXP_{ij} $f(\Delta GDP_j, EXP70_{ij}, \Delta NS_{ij})$

where

ΔEXP_{ij} = Changes in exports from Sweden to country j in products of industry i, 1970-1978 (thousand Kroner)

ΔGDP_j = Changes in real GDP of country j, 1970-1978 (million dollar)

$EXP70_{ij}$ = Exports from Sweden to country j in products of industry i in 1970 (thousand Kroner)

ΔNS_{ij} = Changes in Affiliates' Net Sales, 1970 - 1978 (thousand Kroner)

$NS70_{ij}$ = Affiliates Net Sales in 1970 (thousand Kroner)

The variable for exports in the beginning of the period should incorporate the effects of not only the factors that we controlled for in cross-section equations above, but also most of the unaccounted-for variables that we mentioned.

Initial foreign production and changes in it are included in separate regressions. The variable for the initial production position should tell us whether affiliates substitute, in absolute terms, their own production for imports from the home country as time goes by. In other words, do Swedish exports increase less, given their initial level, to countries with higher initial levels of Swedish-owned production. We should note that this is a different question from the one studied by Swedenborg (1979, 1982) which is whether the proportion of local sales that a company makes made from local production changes with the age of the affiliate. The short- or medium-run effects of foreign production on exports should be

reflected in the coefficients for changes in affiliate production. In other words, do Swedish exports increase less, given their initial level, to countries where Swedish-owned production increases more.

The results from these regressions are as shown in Table 3.

Table 3

Coefficients[a] for Swedish Affiliate Net Sales in a Country in 1970 and Changes in Net Sales, 1970-78, in Equations Explaining Changes in Swedish Exports to the Country 1970-78[b]

	NS70	ΔNS
Paper Products	.201 (1.36)	.058 (1.62)
Chemicals	.448 (2.34)	.179 (1.60)
Metal Mfg.	-.271 (2.60	-.158 (3.19)
Non-Elect. Machinery	.122 (2.27)	.062 (1.81)
Electrical Machinery	.282 (1.04)	-.132 (1.46)
Transport Equipment	1.899 (2.71)	.276 (3.64)
Other Mfg.	.836 (2.44)	.444 (4.65)

[a]t-statistics in parentheses

[b]Both types of equations include, as independent variables, also Swedish exports to a country in 1970, in thousands of Swedish Kroner, and the percentage change in real GDP between 1970 and 1978.

Source: Appendix Table S-4

These results strengthen our earlier impressions of a predominantly positive influence of affiliate production on exports. The variable for

the initial level of affiliate production generally carries a positive and strongly significant coefficient. Metal manufacturing is the main exception. There is thus not much evidence here that Swedish affiliates tend to reduce their imports from Sweden over time. The higher the level of Swedish-owned production in 1970, the larger the increase in Swedish exports between 1970 and 1978. The coefficient for changes in affiliate production is positive in five of the seven industries, and significantly different from zero at the 5 per cent level in three of these. Only in metal manufacturing do we again find a negative and significant coefficient. On the whole, the larger the growth in Swedish-owned production in the host country, the greater the growth in exports from Sweden. This suggests a dominance of complementarity rather than of substitution between overseas production and exports.

Effects of U.S. Affiliate Production

For the United States we show two sets of equations and results. One set of equations, using net sales as the measure of affiliate production, as was done for Swedish affiliates, was available at a much more detailed industry level than the Swedish data: 34 industries, of which we show results for the 28 industries in which we had at least 15 countries with some affiliate net sales. The second set of equations, in which we experiment with other measures of affiliate production, was available only for seven broad industry groups.

The coefficients for affiliate net sales in U.S. export equations are summarized in Table 4.

Table 4

Coefficients for Affiliate Net Sales in Equations
Explaining U.S. Exports, 1982
28 Industries

Coefficients with t > 1	
Positive	
$t \geq 2$	8
$1 \leq t < 2$	2
Negative	
$t \geq 2$	4
$1 \leq t < 2$	2
Coefficients with t < 1	12

Source: Appendix Table US-1

In most of the industries, there is no statistically significant relation between U.S. exports to a country and U.S. affiliate production there. Where that association is significant, two thirds of the coefficients are positive, suggesting complementarity between U.S. exports and U.S.-owned production in a country, rather than substitution of one for the other. The four industries in which there were negative coefficients, suggesting substitution, were

Other foods

Drugs

Primary nonferrous metals

Lumber, Wood, Furniture, and Fixtures

The negative coefficient for Drugs is surprising because it contradicts the strong finding of complementarity for this industry in Lipsey and Weiss (1981).

For broad groups of manufacturing industries we can make two further

sets of calculations. One is to separate affiliate net sales into production for sale within the affiliates' host country and production for export, and a second is to introduce some measures, necessarily crude, of production by minority-owned U.S. affiliates.

As mentioned earlier, we would expect negative coefficients in U.S. export equations to be more likely for net local sales than for net sales. That expectation is confirmed in Table 5 for the four industry groups for which we can make the calculation.

Table 5

Coefficients[a] for U.S. Affiliate Net Sales, Net Local Sales, and Net Export Sales in a Country[b] in Equations[c] Explaining U.S. Exports to the Country

Industry Group	Equations with One Activity Variable		Equations with Two Activity Variables	
	Net Sales	Net Local Sales	Net Local Sales	Net Export Sales
Chemicals	-61 (2.0)	-202 (3.8)	-255 (4.3)	125 (1.6)
Non-Electrical Machinery	222 (1.8)	334 (1.1)	50 (0.1)	313 (0.9)
Electrical Machinery	156 (1.6)	186 (1.1)	-303 (1.3)	915 (2.7)
Transport Equipment	5.9 (0.2)	19 (0.4)	37 (0.5)	-28 (0.3)

[a]t-statistics in parentheses

[b]Excluding Canada

[c]Including, as independent variables, GDP_j, $GDPC_j$, and measures of affiliate activity

Source: Appendix Table US-2

The substitution of net local sales for aggregate sales increases the size of all the coefficients, including the negative coefficient for chemicals. And the addition of the net export sales variable produces two negative coefficients, one of which is significant. The net export sales coefficients are predominantly positive, as we would expect. Thus to the extent that there is any substitution of affiliate production for exports, it is the production for local sale that is involved. Affiliate production for export from the host country tends to raise U.S. exports to the host country.

Production by Minority-Owned Affiliates

Most analyses of trade-investment relationships have concentrated on majority-owned affiliates. The main reason is probably the paucity of data on affiliates that are 50 per cent or less owned by the parent. The Swedish data used above include virtually no information on these affiliates, and the U.S. surveys have exempted them from large parts of the questionnaire, and particularly from the trade questions. One justification for that exemption is that the parent firms often would not know the answers and would not have the same ability to compel cooperation as in the case of majority-owned affiliates.

The omission of affiliates 50 per cent or less owned would be relatively harmless if they were randomly scattered over the world and over industries. We know, however, that they are not. They are virtually the only U.S. affiliates in Japan, for example, and are of considerable importance in that country. Their importance is also associated with industry and country characteristics, such as the technological level of the

industry and the income level of the country, both characteristics often used in the examination of trade-investment relationships.

Aside from its interaction with some of the explanatory variables, production by minority-owned affiliates (for convenience, we will refer to minority ownership, even though it includes a substantial number of cases of 50 per cent ownership) might have different effects on trade from those of production by majority-owned ownership. One possibility would be that the effects would be simply a diluted version of those associated with majority ownership, because they are shared among several owners, some of which are often not U.S. firms. On the other hand, production by minority-owned affiliates might have a stronger effect on parent trade because minority ownership is resorted to in cases in which the parent would otherwise be barred from a market, either because the host country has particularly stringent barriers to imports, or because the parent company does not have a very large technological advantage over other firms. Minority ownership might represent a price for entry into a market more often than does majority ownership.

Because minority-owned affiliates did not receive the questionnaire on the disposition of their sales, we cannot calculate net local sales or net export sales for them. The activity measure for them in the following equations is net sales, whatever the measure used for majority-owned affiliates. We are also limited here to equations for four industry groups instead of the 28 industries used earlier because these equations are based on published data.

The coefficients for majority-owned and minority-owned affiliate production, both measured by net sales, are shown in Table 6. All the coef-

ficients for sales of minority-owned affiliates are positive, as they are also in the equations in which net local sales are the production measure. The only significant negative coefficient is for production by majority-owned affiliates in food industries, as in some cases discussed earlier. On the whole, the addition of data for minority-owned affiliates strengthens the case for a positive effect of affiliates' production on home-country exports.

Table 6

Coefficients[a] for Net Sales of Majority-Owned and Minority-Owned Affiliates in a Country[b] in Equations[c] Explaining U.S. Exports to that Country

Industry Group	Majority-Owned Affiliates	Minority-Owned Affiliates
Foods	-134	25
	(3.5)	(.2)
Chemicals	16	417
	(.7)	(6.6)
Metals	3	66
	(0.1)	(0.7)
Non-Elect. Machinery	289	547
	(3.0)	(1.4)
Electrical Machinery	142	320
	(1.4)	(1.4)
Tranport Equipment	50	44
	(3.0)	(1.9)

[a] t-statistics in parentheses
[b] Excluding Canada
[c] Including, as independent variables, GDP_j, $GDPC_j$, and measures of affiliate production

Source: Appendix Table US-3

Because many observations were missing, we could use the separate measures for net local sales and net export sales of majority-owned affiliates in only

four of the industry groups. This is shown in Table 7. The positive relation of minority-owned affiliate production to exports is again evident. For majority-owned affiliates, there is a predominantly positive relation of total production to U.S. exports. However, in two of the industries, U.S. firms' production for sale in the host country is negatively related to exports to that country. That negative effect, not observed within more disaggregated industries in the earlier calculations, is offset by the expected positive relation of U.S. exports to affiliates' production for export from the country. Thus, there is some hint that a degree of substitution may take place in countries where U.S. firms' production is on a large enough scale to provide for export sales as well as domestic sales. The high coefficients on net export sales also suggest that affiliate production in one country may be substituting to some extent for U.S. exports to other countries.

Table 7

Coefficients[a] for Affiliate Production in a Country in Equations[b] Explaining U.S. Exports to the Country[c]

	Production Measured by		
	Majority-Owned Affiliates		Minority Owned Affiliates
Industry group	Net Local Sales	Net Export Sales	Net Sales
Chemicals	-124 (3.1)	127 (2.9)	337 (5.5)
Non-Electrical	85 (.3)	441 (2.0)	587 (1.3)
Electrical Machinery	-595 (3.2)	1,289 (4.8)	606 (3.6)
Transport Equipment	59 (2.4)	16 (.6)	23 (1.1)

[a]t-statistics in parentheses

[b]Including, as independent variables, GDP_j, $GDPC_j$, and measures of affiliate production.

[c]Excluding Canada

Source: Appendix Table US-3

A check on the results for U.S. exports is to run parallel sets of equations in which the dependent variable is exports by other countries to the same destinations. If U.S.-owned production serves to increase U.S. shares in a country's imports, without expanding the level of imports, U.S.-owned production should be negatively related to exports by other countries to the host countries. If U.S.-owned production increases U.S. sales by expanding markets in host countries, we might find no relation to exports by other countries or even a positive one. A positive relationship could also reflect an expansion of a company's exports to the host country from its other operations outside the U.S. A more troublesome implication

of a positive coefficient would be that it shows that we have not successfully accounted for important determinants of a host-country's imports.

The coefficients in equations for 28 industries using net sales as the affiliate production measure, shown in Appendix Table US-4, are all positive and all but a few are statistically significant. Among the possible interpretations we lean toward the likelihood that some important factor explaining trade may have been omitted from the equations for U.S. exports.

We can include minority affiliate activity and the division of sales between local and export for only four industries. While the number of cases is too small to be conclusive, if we introduce production by U.S. minority-owned affiliates into the equations, as we can do for the broad industry groups, we find (Table 8) that the positive relation between U.S.-owned production and sales by other countries remains. However, production by minority-owned U.S. firms does appear to substitute for a country's imports from countries other than the U.S.

Table 8

Coefficients[a] for Production by Majority-Owned and Minority-Owned U.S. Affiliates in a Country[b] in Equations[c] Explaining Exports to a Country by Countries other than the U.S.

	Production of	
Industry group	Majority-Owned Affiliates	Minority-Owned Affiliates
Foods	585 (1.7)	-2,194 (1.8)
Chemicals	255 (3.5)	-2,446 (4.6)
Metals	2,279 (4.1)	-2,252 (1.6)
Non-Elect. Machinery	593 (2.0)	1,152 (0.9)
Electrical Machinery	2,043 (6.7)	-158 (.2)
Transport Equipment	512 (2.9)	-641 (2.7)

[a] t-statistics in parentheses

[b] Excluding Canada

[c] Including, as independent variables, GDP_j, $GDPC_j$, and measures of affiliate production

Source: Appendix Table US-5

Some further hint of what we may be missing by omitting minority affiliates from our earlier calculations can again be gleaned from the equations in Table 9. These separate affiliate production for local sale from production for export and include minority affiliate net sales. The large positive coefficients in the equations for exports by other countries are associated mainly with U.S. affiliates' production for export. We would not expect these to compete with foreign countries' exports to the produc-

tion location. Production by U.S. minority-owned affiliates in two industries, and production for local sale by majority-owned affiliates in one industry, do appear to substitute for imports from countries other than the U.S.

Table 9

Coefficients[a] for U.S. Affiliate Local and Export Sales in Equations[b] Explaining Exports to a Country[c] by Countries other than the U.S.

	Majority-Owned Affiliates		Minority-Owned Affiliates
	Net Local Sales	Net Export Sales	Net Sales
Chemicals	-270	1,141	-2,616
	(.8)	(3.0)	(5.0)
Non-Elect. Machinery	-1,665	2,355	1,304
	(2.7)	(4.8)	(1.3)
Elect. Machinery	1,212	3,408	-1
	(1.4)	(2.7)	(.0)
Transport Equipment	586	15	-1,025
	(7.0)	(.2)	(15.0)

[a]t-statistics in parentheses

[b]Including, as independent variables, GDP_j, $GDPC_j$, and measures of affiliate production

[c]Excluding Canada

Source: Appendix Table US-5

There is a preponderance of positive coefficients for minority-owned U.S. affiliate production in U.S. export equations, and of negative coefficients in equations for exports by others to a market. That suggests that minority-owned production, even more than production by majority-owned affiliates, is a way in which U.S. firms buy entry into a market or market share for themselves, and hinder it for their foreign rivals.

Conclusions

The predominant relationship between production in a country by affiliates of Swedish and U.S. firms and exports to that country from Sweden and the U.S. is something between no effect on home-country exports at all and inducing a higher level of home-country exports.

The higher the level of Swedish affiliate production in a country, the higher the level of Swedish exports to that country in that industry. This relationship in OLS equations is confirmed in a 2SLS analysis that attempts to remove the effects of the simultaneous determination of Swedish exports and host-country affiliate production by Swedish firms and is observed whether production is measured by affiliate net sales or by net local sales. The same conclusions are produced by an analysis of changes over time in Swedish exports. Both high initial levels of Swedish affiliate production in a country and increases in production are positively associated with increases in Swedish exports to the country.

The results for the U.S. are more mixed. At the most disaggregated industry level there is a predominance of positive relationships between affiliate net sales and U.S. exports, but there are a few negative coefficients implying some substitution of affiliate production for exports from the U.S. Data for broad industry groups give some indication that part of the positive influence of affiliate production on exports from the U.S. is the effect of affiliate production for export from the host country. Minority-owned affiliates of U.S. firms were somewhat more likely to be a means of buying market shares for the U.S. and denying them to others than were majority-owned affiliates.

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Appendix

Data

The U.S. affiliate production data are from the individual firm reports underlying U.S. Department of Commerce (1985), a presumably quite complete census of U.S. direct investment abroad in 1982. Since these reports are confidential, the calculations described here were carried out for us within the Bureau of Economic Analysis of the U.S. Department of Commerce.

The Swedish data for production of individual foreign affiliates come from the Industriens Utredningsinstitut (IUI) of Stockholm. The IUI has completed four surveys of Swedish multinationals foreign investment abroad covering 1965, 1970, 1974, and 1978. These surveys cover virtually all Swedish firms investing abroad and are in general comparable to the BEA surveys (see Swedenborg, 1979 and 1982).

Exports by the U.S. and all market economies to different countries, by the industry classifications used in the U.S. direct investment survey, were taken from United Nations trade tapes and converted from the SITC to this industry classification. Swedish exports by industry are from Statistiska Centralbyran (Utdrag ur Makrobasen).

Appendix Table S-1

OLS Regression Results for the Determinants of Swedish Manufactured Exports, 1978

7 Industry Groups

Industry (No. Obs.)	Coefficients of: Intercept	GDP	GDP per capita (GDPC)	Dummy for being a nordic country (NORDIC)	Net Sales (NS)	$\bar{R}^2$
Paper Products (66)	997 (.16)	-.02 (1.82)	1.72 (1.28)	225 (11.3)	.229 (4.98)	.81
Chemicals (66)	-30,912 (1.03)	-.03 (.41)	14.89 (2.30)	1,032 (10.7)	.836 (4.05)	.78
Metal Mfg. (66)	-21,199 (1.26)	-.01 (.27)	9.86 (2.62)	459 (8.5)	.379 (4.43)	.75
Non-Elect. Mach. (66)	-15,989 (.68)	.23 (4.22)	17.62 (3.40)	849 (11.5)	.359 (12.9)	.92
Elect. Mach. (66)	-16,629 (.91)	.00 (.11)	20.54 (5.29)	500 (8.6)	.086 (1.40)	.72
Transp. Equip. (66)	-43,300 (.97)	.69 (7.60)	20.08 (2.06)	1,010 (7.1)	.312 (3.49)	.73
Other Mfg. (66)	-44,522 (1.07)	.04 (.43)	24.77 (2.79)	764 (5.9)	1.137 (6.64)	.68

GDP = Real GDP in 1978 in millions of international dollars, derived from data for 1980 in United Nations and Commission of the European Communities (1986) and extrapolated to 1982 and to countries not covered in the survey by methods described in Kravis and Lipsey (1984).

GDPC = Real GDP per capita in 1978 international dollars

NORDIC: Coefficient in millions of Kroner

Net Sales = Affiliate net sales, derived as total affiliate sales minus imports from Sweden (thousand Kroner)

Numbers in parentheses are t-statistics

Appendix Table S-2

2SLS Regression Results for the Determinants of Swedish Manufactured Exports, 1978

7 Industry Groups

Industry (No. Obs.)	Intercept	Coefficients of GDP	GDP per capita (GDPC)	Dummy for being a Nordic country (NORDIC)	Dummy for EEC member-ship (EEC)	Net sales (NS)	$\bar{R}^2$
			First Stage				
Paper Products (66)	-16,422 (1.11)	.13 (4.55)	3.68 (1.10)	119 (2.57)	138 (4.50)	--	.56
Chemicals (66)	-4,767 (.27)	.18 (5.22)	3.96 (1.01)	93 (1.71)	106 (2.93)	--	.49
Metal Mfg. (66)	-4,723 (.28)	.22 (6.48)	2.80 (.74)	140 (2.68)	309 (8.93)	--	.76
Non-Elect. Mach. (66)	-72,056 (.91)	.97 (6.10)	12.01 (.67)	-120 (.48)	1,201 (7.29)	--	.68
Elect. Mach. (66)	19,358 (.51)	.19 (2.56)	6.26 (.73)	32 (.27)	115 (1.46)	--	.17
Transp. Equip. (66)	-6,631 (.11)	-.10 (.84)	15.21 (1.12)	-254 (1.35)	384 (3.08)	--	.16
Other Mfg. (66)	-14,096 (.51)	.08 (1.36)	2.97 (.47)	-5 (.06)	225 (3.91)	--	.26

(continued)

Appendix Table S-2 (concluded)

Industry (No. Obs.)	Intercept	Coefficients of GDP	GDP per capita (GDPC)	Dummy for being a Nordic country (NORDIC)	Dummy for EEC member-ship (EEC)	Net Sales (NS)	$\bar{R}^2$
			Second Stage				
Paper Products (66)	6,172 (.82)	-.05 (2.61)	-.26 (.14)	201 (7.9)	--	.435 (4.09)	.75
Chemicals (66)	-122 (.00)	-.51 (2.17)	-7.98 (.51)	783 (3.7)	--	3.511 (3.09)	.50
Metal Mfg. (66)	-18,247 (1.06)	-.04 (.85)	7.90 (1.97)	443 (7.9)	--	.500 (4.34)	.75
Non-Elect. Mach. (66)	-14,603 (.61)	.22 (3.60)	17.02 (3.08)	850 (11.5)	--	.368 (9.05)	.91
Elect. Mach. (66)	-21,828 (.87)	-.08 (.78)	15.73 (2.19)	487 (6.2)	--	.516 (1.15)	.60
Transp. Equip. (66)	-24,446 (.41)	.76 (6.06)	.75 (.05)	1,165 (5.7)	--	.921 (2.85)	.60
Other Mfg. (66)	-6,108 (.10)	-.06 (.47)	7.60 (.54)	772 (4.2)	--	2.490 (4.58)	.50

For definitions, see notes to Appendix Table S-1

Appendix Table S-3

OLS Regression Results Separating Net Sales (NS) and Net Local Sales (NLS)

in Equations Explaining Swedish Manufactured Exports, 1978

Industry (No. Obs.)	Intercept	Coefficients of GDP	GDP per capita (GDPC)	Dummy for being a Nordic country (NORDIC)	Net Sales (NS)	Net local sales (NLS)	$\bar{R}^2$
Paper Products (19)	-25,102 (.56)	-.03 (1.16)[a]	5.83 (.87)	217 (5.20)	.217 (2.11)	--	.74
Chemicals (30)	-92,998 (1.10)	-.07 (.61)	27.62 (1.91)	984 (6.52)	.809 (2.29)	--	.74
Metal Mfg. (19)	-112,624 (1.01)	-.03 (.35)	25.15 (1.52)	424 (3.68)	.330 (1.59)	--	.60
Non-Elect. Mach. (21)	-64,951 (.57)	.21 (2.00)	29.79 (1.82)	794 (5.49)	.336 (5.87)	--	.85
Elect. Mach. (24)	-14,801 (.27)	.01 (.24)	19.98 (2.39)	504 (7.54)	.083 (1.11)	--	.80
Paper Products (19)	-20,370 (.50)	-.05 (1.79)	5.15 (.85)	209 (5.43)	--	.351 (2.79)	.76
Chemicals (30)	-98,567 (1.16)	-.09 (.73)	29.42 (2.06)	995 (6.64)	--	.870 (2.32)	.73
Metal Mfg. (19)	-109,646 (.93)	.02 (.22)	30.34 (1.77)	400 (3.18)	--	.268 (.80)	.52
Non-Elect. Mach. (21)	-56,852 (.52)	.09 (.83)	33.00 (2.15)	787 (5.74)	-- --	.508 (6.32)	.86
Elect. Mach. (24)	-15,333 (.28)	.01 (.25)	20.19 (2.42)	505 (7.55)	--	.085 (1.12)	.79

Net local sales in thousands of Kroner

Appendix Table S-4

OLS Regression Results for the Determinants of Changes in

Swedish Manufactured Exports, 1970-1978

7 Industry Groups

Industry (No. Obs.)	Intercept	Coefficients of: Change in GDP (ΔGDP)	Exports 1970 (EXP70)	Change in Net Sales (ΔNS)	Net Sales (NS70)	$\bar{R}^2$
Paper Products (66)	-.53 (.02)	-.04 (.98)	2.44 (14.1)	.058 (1.62)	--	.83
Chemicals (66)	-1,280 (.14)	-.10 (.88)	2.68 (25.1)	.179 (1.60)	--	.93
Metal Mfg. (66)	469 (.11)	.05 (.85)	2.27 (25.3)	-.158 (3.19)	--	.94
Non-Elect. Mach. (66)	-7,683 (.73)	.36 (2.96)	1.54 (14.6)	.062 (1.81)	--	.93
Elect. Mach. (66)	24,239 (1.64)	-.02 (.12)	2.03 (7.5)	-.132 (1.46)	--	.46
Transp. Equip. (66)	15,199 (.60)	1.14 (4.0)	.84 (6.2)	.276 (3.64)	--	.61
Other Mfg. (66)	16,233 (1.40)	-.21 (1.64)	1.68 (17.3)	.444 (4.65)	--	.89

(continued)

Appendix Table S-4 (concluded)

Industry (No. Obs.)	Intercept	Coeffients of: Changes in GDP (ΔGDP)	Exports 1970 (EXP70)	Changes in Net Sales (ΔNS)	Net Sales (NS70)	$\bar{R}^2$
Paper Products	-849	-.01	2.49	--	.201	.83
(66)	(.28)	(.33)	(15.2)		(1.36)	
Chemicals	-3,334	-.08	2.67	--	.448	.93
(66)	(.38)	(.83)	(26.7)		(2.34)	
Metal Mfg.	214	-.01	2.27	--	-.271	.93
(66)	(.05)	(.18)	(22.5)		(2.60)	
Non-Elect. Mach.	-6,759	.31	1.56	--	.122	.93
(66)	(.65)	(2.45)	(17.5)		(2.27)	
Elect. Mach.	21,589	-.15	1.78	--	.282	.47
(66)	(1.44)	(.94)	(6.2)		(1.04)	
Transp. Equip.	18,450	1.08	.87	--	1.899	.57
(66)	(.70)	(3.59)	(6.1)		(2.71)	
Other Mfg.	11,328	-.12	1.71	--	.836	.86
(66)	(.88)	(.88)	(14.3)		(2.44)	

For definitions of variables, see text

Appendix Table US-1

Equations for U.S. Exports to a Country as a Function of Country Characteristics and of Net Sales in that Country by Majority-Owned U.S. Affiliates, 1982

OLS Regressions, 28 Industries

Ind. No.	Intercept	Coefficients of GDP	GDP per Capita (GDPC)	Net Sales (NS)	$\bar{R}^2$	No. of Obs.
1	-3,586	.09	4.5	.01	.24	48
	(0.3)	(1.9)	(2.1)	(0.6)		
2	-498	.02	.26	-.0	.56	47
	(0.6)	(4.4)	(1.9)	(0.0)		
3	720	.03	1.8	-.04	.05	44
	(0.1)	(1.2)	(1.6)	(1.4)		
4	-21,024	1.4	3.8	-.24	.77	48
	(0.6)	(11.7)	(0.6)	(4.3)		
5	-3,176	.15	4.6	.15	.64	48
	(0.4)	(5.2)	(3.0)	(2.3)		
6	----------NA----------					
7	----------NA----------					
8	2,583	-.04	.80	-.01	.20	48
	(0.6)	(2.8)	(1.1)	(0.6)		
9	1,809	.03	.48	.31	.80	48
	(0.5)	(2.4)	(0.8)	(10.3)		
10	-12,142	.44	1.6	-.08	.86	48
	(1.8)	(13.9)	(1.4)	(4.7)		
11	-1,317	.03	1.0	.01	.47	48
	(0.6)	(2.3)	(2.6)	(0.9)		
12	15,796	.08	-1.2	.26	.60	47
	(4.0)	(5.7)	(1.7)	(4.2)		
13	12,058	1.5	.72	.02	.83	48
	(0.4)	(13.0)	(0.1)	(0.5)		
14	1,296	.33	1.6	-.04	.83	48
	(0.2)	(12.3)	(1.3)	(1.1)		
15	291	.04	1.4	.02	.60	48
	(0.1)	(4.4)	(3.4)	(1.6)		
16	-1,802	.03	1.2	.06	.60	48
	(0.7)	(3.1)	(2.6)	(2.4)		

Appendix Table US-1 (continued)

Ind. No.	Intercept	Coefficients of GDP	Coefficients of GDP per Capita (GDPC)	Coefficients of Net Sales (NS)	$\bar{R}^2$	No. of Obs.
17	----------NA----------					
18	-26,747	.54	3.5	-.31	.85	48
	(2.7)	(14.0)	(2.0)	(3.2)		
19	2,038	.18	7.7	.02	.21	48
	(0.1)	(1.9)	(1.7)	(0.4)		
20	----------NA----------					
21	22,299	.07	6.5	.07	.14	48
	(1.0)	(0.8)	(1.6)	(0.1)		
22	-19,834	.12	16.8	.28	.83	48
	(0.6)	(0.7)	(3.0)	(7.5)		
23	6,151	.73	21.6	.18	.54	48
	(0.1)	(3.8)	(2.4)	(1.7)		
24	-4,143	-.01	2.5	.03	.13	48
	(0.7)	(0.4)	(2.5)	(0.5)		
25	2,524	.26	2.4	-.05	.56	48
	(0.2)	(6.5)	(1.2)	(0.4)		
26	22,660	.05	2.0	.70	.61	48
	(0.9)	(0.5)	(0.4)	(6.3)		
27	-19,825	.61	13.4	.03	.61	48
	(0.7)	(5.8)	(2.8)	(0.2)		
28	-19,400	.03	19.4	.01	.14	48
	(0.5)	(0.2)	(2.6)	(0.7)		
29	----------NA----------					
30	-45,886	1.26	-.67	-3.75	.74	48
	(1.5)	(11.2)	(0.1)	(5.6)		
31	----------NA----------					
32	-1,907	.03	1.5	-.01	.37	48
	(0.6)	(3.0)	(2.8)	(0.4)		
33	-44,303	.84	12.2	.16	.94	48
	(2.8)	(14.6)	(4.4)	(7.7)		
34	-15,518	.12	6.0	.49	.54	48
	(1.1)	(2.1)	(2.5)	(2.5)		

Notes to Appendix Table US-1

Canada is excluded from the equations

GDP = Real GDP in 1982 in millions of international dollars (see notes to Appendix Table S-1).

GDPC = Real GDP per capita in 1982.

Net Sales = Affiliate net sales, derived as total affiliate sales minus imports from the U.S.

Numbers in parentheses are t-statistics.

The 34 industries are the following:

1. Grain Mill and Bakery Products
2. Beverages
3. Tobacco
4. Other Food Products
5. Textiles and Apparel
6. Leather and Leatherware
7. Pulp and Paper
8. Paper Products
9. Printing and Publishing
10. Drugs
11. Soap, Cleansers, Toilet Goods
12. Agricultural Chemicals
13. Industrial Chemicals
14. Other Chemicals
15. Rubber Products
16. Plastic Products
17. Primary Metals, Ferrous
18. Primary Metals, Nonferrous
19. Fabricated Metals
20. Farm and Garden Machinery
21. Construction and Related Machinery
22. Office and Computing Machinery
23. Other Non Electrical Machinery
24. Household Appliances
25. Radio, TV and Communication Equipment
26. Electronic Components
27. Other Electrical Machinery
28. Motor Vehicles and Equipment
29. Other Transport Equipment
30. Lumber, Wood, Furniture, and Fixtures
31. Glass Products
32. Stone, Clay, Cement, Concrete
33. Instruments and Related Products
34. Other Industries

Appendix Table US-2

Equations for U.S. Exports to a Country as a Function of Country Characteristics and of Production in that Country by Majority-Owned U.S. Affiliates, 1982

OLS Equations, Six Industry Groups

Ind. Group	Intercept	GDP	GDP per Capita (GDPC)	Net Sales (NS)	Net Local Sales (NLS)	Net Export Sales (NXS)	$\bar{R}^2$	No. of Obs.
A	-54.6	1.80	5.98	-135.4			.87	23
	(0.89)	(11.16)	(0.52)	(4.26)				
B	17.7	2.53	11.85	-60.90			.87	27
	(0.21)	(11.22)	(0.83)	(1.96)				
C	7.9	.80	2.03	-6.99			.78	20
	(0.15)	(7.10)	(0.26)	(0.17)				
D	66.8	.59	48.14	222.1			.64	26
	(0.36)	(0.46)	(1.88)	(1.80)				
E	156.2	1.14	-9.50	155.6			.59	24
	(1.31)	(3.80)	(0.48)	(1.56)				
F	-81.1	.88	51.24	5.92			.52	24
	(0.67)	(2.82)	(2.83)	(0.22)				
B	21.9	2.88	17.92		-202.2		.92	17
	(0.20)	(11.0)	(0.88)		(3.82)			
D	20.0	.92	55.52		334.3		.63	24
	(0.10)	(0.52)	(2.09)		(1.13)			
E	103.0	1.07	6.99		185.8		.61	18
	(0.76)	(3.09)	(0.30)		(1.10)			
F	-72.0	.92	48.35		19.15		.53	22
	(0.56)	(2.88)	(2.54)		(0.40)			
B	110.2	3.11	-10.84		-255.3	125.3	.92	17
	(0.94)	(10.80)	(0.41)		(4.26)	(1.56)		
D	48.1	1.22	45.46		50.1	312.7	.62	24
	(0.24)	(0.68)	(1.57)		(0.12)	(0.90)		
E	44.9	1.32	4.64		-303.3	914.6	.73	18
	(0.39)	(4.34)	(0.24)		(1.32)	(2.73)		
F	-75.0	.93	48.64		37.0	-27.6	.51	22
	(0.57)	(2.83)	(2.49)		(0.50)	(0.32)		

Industry Groups defined in terms of the industries of Appendix Table US-1 are:

A. Foods and Kindred Products (Nos. 1-4)

B. Chemicals and Allied Products (Nos. 10-14)

C. Metals (Nos. 17-19)

D. Non-electrical machinery (Nos. 20-23)

E. Electrical Machinery (Nos. 24-27)

F. Transport Equipment (Nos. 28 & 29)

Appendix Table US-3

Equations for U.S. Exports to a Country as a Function of Country Characteristics and of Production in that Country by both Majority-Owned and Minority-Owned U.S. Affiliates, 1982

OLS Equations, Six Industry Groups

Industry Group	Intercept	GDP	GDP per Capita (GDPC)	Coefficients of Majority-Owned Affiliate Net Sales (NS)	Net Local Sales (NLS)	Net Export Sales (NXS)	Minority-Owned Affiliate Net Sales (MONS)	$\bar{R}^2$	No. of Obs.
A	-58.6	1.75	8.05	-133.6			25.4	.86	22
	(0.91)	(6.85)	(0.64)	(3.54)			(0.20)		
B	100.0	1.02	3.04	15.5			417.0	.95	27
	(1.88)	(3.82)	(0.35)	(0.70)			(6.55)		
C	-34.8	.75	5.17	2.7			66.4	.81	18
	(0.63)	(5.37)	(0.65)	(0.07)			(0.66)		
D	277.3	-.44	2.28	289.2			546.9	.85	24
	(2.41)	(0.54)	(0.13)	(3.03)			(1.37)		
E	149.0	.85	-7.03	142.3			320.2	.61	24
	(1.28)	(2.38)	(0.36)	(1.45)			(1.40)		
F	34.9	.36	18.53	50.0			43.8	.86	19
	(0.61)	(1.26)	(2.31)	(3.00)			(1.92)		
B	18.7	1.42	26.20		-74.9		335.9	.96	17
	(0.26)	(3.79)	(1.94)		(1.66)		(4.40)		
D	224.0	-.33	13.06		424.7		769.5	.82	22
	(1.65)	(0.27)	(0.68)		(1.81)		(1.70)		
E	90.0	.85	9.65		142.0		289.6	.62	18
	(0.67)	(2.16)	(0.42)		(0.83)		(1.16)		
F	18.3	.73	16.17		65.0		18.1	.92	17
	(0.40)	(3.23)	(2.46)		(3.04)		(1.02)		
B	108.3	1.64	-2.93		-124.0	127.1	337.1	.98	17
	(1.68)	(5.32)	(0.20)		(3.11)	(2.90)	(5.54)		
D	268.3	.06	-3.40		85.2	440.7	586.7	.85	22
	(2.11)	(0.05)	(0.17)		(0.31)	(2.03)	(1.34)		
E	-6.3	.95	9.25		-595.4	1,289.0	606.3	.85	18
	(0.07)	(3.88)	(0.64)		(3.19)	(4.81)	(3.59)		
F	23.1	.67	16.03		59.2	15.5	22.6	.92	17
	(0.48)	(2.59)	(2.37)		(2.42)	(0.55)	(1.13)		

For notes, see Appendix Table US-2

Appendix Table US-4

Equations for Exports to a Country by Countries other than the U.S. as a Function of Country Characteristics and of Net Sales in that Country by Majority-Owned U.S. Affiliates, 1982

OLS Equations, 34 Industries

Ind. No.	Intercept	Coefficients of GDP	Coefficients of GDP per Capita (GDPC)	Coefficients of Net Sales (NS)	$\bar{R}^2$	No. of Obs.
1	-1,501	.08	13.64	.12	.48	48
	(.1)	(.9)	(3.3)	(3.4)		
2	-67,692	.35	19.21	.56	.65	47
	(2.0)	(2.3)	(3.3)	(3.0)		
3	-12,361	.16	5.84	.05	.27	44
	(.6)	(2.4)	(1.7)	(.5)		
4	-524,864	6.11	127.38	1.57	.77	48
	(1.9)	(7.0)	(2.6)	(3.5)		
5	-595,386	4.40	188.19	7.20	.62	48
	(1.8)	(4.1)	(3.2)	(2.9)		
6	----------NA----------					
7	----------NA----------					
8	-35,804	.08	15.80	.25	.48	48
	(1.7)	(1.0)	(4.4)	(2.3)		
9	-32,392	.10	19.49	.79	.57	48
	(1.3)	(1.1)	(4.3)	(3.5)		
10	-28,181	.50	22.67	.15	.81	48
	(1.2)	(4.7)	(5.7)	(2.6)		
11	-28,862	-.08	15.03	.22	.73	48
	(2.2)	(1.2)	(6.5)	(5.2)		
12	-4,176	.36	10.22	.60	.32	47
	(.1)	(3.0)	(1.7)	(1.1)		
13	-204,377	4.22	115.87	1.05	.66	48
	(18)	(4.7)	(2.5)	(3.4)		
14	-42,332	.51	26.06	.62	.77	48
	(1.3)	(4.4)	(4.7)	(4.2)		
15	-78,931	.30	30.73	.33	.55	48
	(2.1)	(2.2)	(4.7)	(2.1)		
16	-33,130	-.12	15.26	1.79	.84	48
	(1.9)	(1.7)	(4.8)	(9.9)		
17	----------NA----------					
18	-189,789	2.65	52.63	4.31	.86	48
	(2.2)	(8.0)	(3.4)	(5.1)		
19	-94,157	.01	84.50	.75	.69	48
	(1.1)	(.03)	(5.8)	(4.6)		

Appendix Table US-4 (concluded)

Ind. No.	Intercept	Coefficients of GDP	Coefficients of GDP per Capita (GDPC)	Coefficients of Net Sales (NS)	$\bar{R}^2$	No. of Obs.
20	----------NA----------					
21	20,148	.08	31.75	.44	.51	48
	(.4)	(.5)	(3.9)	(3.3)		
22	-4,195	-.78	31.14	.58	.89	48
	(.1)	(4.2)	(4.7)	(13.12)		
23	23,828	1.22	122.35	1.69	.72	48
	(.2)	(2.1)	(4.5)	(5.0)		
24	-46,371	.07	24.80	2.00	.72	48
	(1.6)	(.7)	(5.0)	(6.2)		
25	-106,328	1.06	64.86	.93	.45	48
	(1.0)	(3.0)	(3.6)	(.9)		
26	-36,407	.08	18.52	1.27	.80	48
	(1.1)	(.6)	(3.2)	(9.0)		
27	-103,211	.92	79.26	1.25	.63	48
	(1.1)	(2.8)	(5.0)	(2.5)		
28	-334,881	1.72	237.42	.41	.56	48
	(1.0)	(1.4)	(4.1)	(3.6)		
29	----------NA----------					
30	-286,367	3.29	69.63	.61	.85	48
	(3.5)	(10.9)	(4.9)	(.3)		
31	----------NA----------					
32	-42,197	-.02	33.65	2.20	.56	48
	(.8)	(.1)	(3.8)	(4.1)		
33	-100,277	.84	64.71	.75	.77	48
	(1.2)	(2.8)	(4.4)	(6.7)		
34	-182,887	.02	88.65	6.03	.56	48
	(1.5)	(0.0)	(4.2)	(3.4)		

For definitions and industry list, see notes to Appendix Table US-1.

Numbers in parentheses are t-statistics.

Appendix Table US-5

Equations for Exports by Countries Other than the U.S. to a Country as a Function of Country Characteristics and of Production in that Country by both Majority-Owned and Minority-Owned U.S. Affiliates, 1982

OLS Equations, Six Industry Groups

Industry Group	Intercept	Coefficients of: GDP	GDP per Capita (GDPC)	Majority-Owned Affiliate: Net Sales (NS)	Majority-Owned Affiliate: Net Local Sales (NLS)	Majority-Owned Affiliate: Net Export Sales (NXS)	Minority-Owned Affiliate Net Sales (MONS)	$\bar{R}^2$	No. of Obs.
A	-1,289	8.96	353.7	584.8			-2,194	.80	22
	(2.14)	(3.76)	(3.0)	(1.66)			(1.85)		
B	-1,055	11.75	511.5	254.6			-2,446	.87	27
	(2.41)	(5.33)	(2.80)	(3.54)			(4.65)		
C	-810.4	5.20	323.3	2,278.8			-2,252	.81	18
	(1.07)	(2.70)	(2.98)	(4.14)			(1.63)		
D	52.4	2.68	181.4	592.6			1,152	.88	24
	(0.14)	(1.06)	(3.33)	(1.97)			(0.92)		
E	-255.1	-.08	151.7	2,042.7			-158	.80	24
	(0.70)	(0.07)	(2.52)	(6.72)			(0.22)		
F	-547.7	7.59	215.7	511.8			-641	.85	19
	(0.92)	(2.51)	(2.57)	(2.94)			(2.69)		
B	-2,034	11.27	615.4		170.9		-2,627	.89	17
	(3.27)	(3.45)	(5.22)		(0.43)		(3.95)		
D	-201.3	5.93	211.6		148.8		2,282	.86	22
	(0.48)	(1.58)	(3.50)		(0.20)		(1.61)		
E	-208.5	-.57	215.1		3,160.4		-843	.78	18
	(0.44)	(0.41)	(2.62)		(5.20)		(0.95)		
F	-398.0	13.13	139.2		591.4		-1,030	.99	17
	(2.59)	(17.1)	(6.26)		(8.16)		(17.19)		
B	-1,230.5	13.26	353.8		-270.2	1,140.9	-2,616	.93	17
	(2.22)	(5.02)	(2.81)		(0.79)	(3.04)	(5.03)		
D	35.0	7.97	123.6		-1,665.3	2,355.2	1,304	.94	22
	(0.12)	(3.11)	(2.77)		(2.67)	(4.76)	(1.34)		
E	-463.1	-.29	214.0		1,211.2	3,407.5	-.6	.89	18
	(1.14)	(0.25)	(3.13)		(1.37)	(2.69)	(0.01)		
F	-393.2	13.07	139.1		585.7	15.4	-1,025	.99	17
	(2.41)	(14.75)	(6.01)		(7.00)	(0.16)	(15.0)		

For notes, see Appendix Table US-2.