Industriens Utredningsinstitut

THE INDUSTRIAL INSTITUTE FOR ECONOMIC AND SOCIAL RESEARCH

A list of Working Papers on the last pages

No. 377, 1993

**INTERNATIONAL ORGANIZATION OF
PRODUCTION AND VARIATION IN
EXPORTS FROM AFFILIATES**

by

Thomas Andersson and Torbjörn Fredriksson

March 1993

2.92 10.000

International Organization of Production and Variation in Exports from Affiliates

Thomas Andersson and Torbjörn Fredriksson

Industrial Institute for Economic and Social Research (IUI)

Box 5501, 114 85 Stockholm, Sweden

April 1993

Abstract

This paper explains the variation in exports from Swedish affiliates, demonstrating a strong influence of vertical and horizontal integration, and refuting a simple relationship between internationalization and expanding trade. High export propensity is associated with production in few countries, low R&D intensity in the parent company, absence of input goods that are specific to the home country, large and young affiliates, a small host country market, high income and a location in the European Community

1. Introduction[1]

World trade is increasingly influenced by multinational firms, which own and control assets in more than one country through direct investment.[2] With the product-life cycle, Vernon (1966 and 1979) showed that multinational firms may diversify their international pattern of production. Much of the subsequent studying on foreign investment has been based on the assumption that affiliates are vertically integrated with the parent company. Most analyses have also been limited to a two-country framework of interactions between a home and a host country. The underlying assumption has been that the headquarter serves as a node to which all foreign activities are connected.

In the last decade, it has increasingly been emphasized that multinational firms organize interactions between multiple countries. Markusen (1984) analyzed the existence of multiplant economies, which favor production in several countries. In his model, a firm relies on research and development (R&D) and other sources of firm-specific assets located at home, while production is undertaken abroad. Observing an inverse U-shaped relationship between exports from the parent company to affiliates and the internationalization of the company group, Pearce (1982) argued that high levels of internationalization of a firm lead to expanding transactions between affiliates and less exports from home. According to Bartlett and Goshal (1989), foreign affiliates are developing into centres of industrial structures and strategic initiatives. Several studies have concluded that multi-centre structures become increasingly pronounced the greater the proportion of their activities which is located abroad (cf. Hedlund, 1986; Kogut, 1990).

The lack of appropriate data makes it difficult to investigate such propositions in detail. A measurable indicator would be the extent to which affiliates export to third

countries. Using industry-data, Kravis and Lipsey (1982) found that US direct investment stimulates exports primarily from countries which are large and have high wages. Internalization of operations becomes superior to arm's length contracts due to firm-specific assets, however, which complicates generalizations across firms. In particular, Caves (1971) clarified that operations abroad may be either horizontally or vertically integrated, with far-reaching implications for the pattern of trade.[3]

A number of studies of particularly U.S. and Japanese firms have demonstrated that exports from foreign affiliates are becoming increasingly important (cf. Blomström and Lipsey, 1990; Kume and Totsuka, 1991). However, there have still not been any systematic studies of the determinants of exports from host countries on the level of individual firms and affiliates. To cast further light on this issue, the present study analyzes variation in the propensity of affiliates to export by applying a Tobit model on data from the Industrial Institute for Economic and Social Research (IUI). Covering intra-firm transactions for virtually all Swedish multinational firms in manufacturing from 1974 to 1990, and some 2000 observations in 50 countries, we are able to separate between factors related to multinational firms as a whole, specific affiliates, and specific host countries or groups of countries.

The behaviour of Swedish-based firms should be an interesting object of study, since most work on multinational corporations has been based on US data, although small industrialized countries are developing into important sources of direct investment. Furthermore, Sweden is located close to the European Community - which has gone through a process of regional liberalization which Sweden itself has not been part of. Except for demonstrating differences which are associated with vertical and horizontal integration of companies, the study presents evidence on the role of R&D intensity, plant-economies to scale and other firm-, affiliate- and country-specific characteristics for exports from affiliates. All in all, the results refute the view

---

[3]   Conglomerates represent a third form of organization, which is not dealt with here since the implications for trade are less clearcut. It can also be noted that conglomerates appear to have become less important in recent decades (Wernerfelt and Montgomery, 1988; Porter, 1991)

of a simple connection between the internationalization of firms and an expansion of third-country relations, and underscores the importance of understanding the kind of organization adopted by firms.

The study is organized as follows. Section 2 discusses the motivations for vertical and horizontal integration. Hypotheses for empirical testing are introduced in Section 3. Section 4 presents the data base. The estimation and the results are presented in Section 5. The final section concludes.

2. Alternative forms of integration

As laid out by Caves (1971), there are alternative ways for firms to organize international operations. With horizontal integration, foreign affiliates are involved in activities which resemble those at home. Given that an affiliate covers an identical line of activities, it will be a replica of the parent company. Competitiveness derives from a patent or a brand name, while the production process is standardized, unrelated to country-specific input goods, and benefits from proximity to customers due to, e.g., large transportation and information costs coupled with a great need of after-sales-services. Know-how stemming from, e.g., research and development is a crucial factor. In other words, there are not enough economies to scale at the plant level to motivate a concentration of operations in a limited number of locations. Furthermore, country differences in factors of production are not sufficient to motivate an international specialization of operations. Each affiliate produces for its own specific market, and there is little trade between units in different countries.

Another alternative is vertical integration, which can be divided into forward and backward integration. The former is associated with the distribution of intermediate goods, and the latter with securing the access to input goods. Both indicate international specialization, since the production apparatus of affiliates supplements that of the parent company rather than replicates it.[4] Vertical integration becomes

---

[4] In the case of Swedish multinationals, the so far dominant form is forward vertical integration, partly because resource-intensive industries have been based on domestic raw materials.

more favorable the greater the economies to scale at the plant level from concentrating a line of activity, and/or the greater the differences between stages of production in terms of the intensity with which they exploit various factors of production. If concentrating production processes in certain locations is to be preferable, the reduction in costs must be large enough to outweigh the increased transport costs of shipping intermediate goods back and forth (Casson et al., 1986).

There is consequently one kind of organization which should be associated with a modest amount of international trade, and one which stimulates more international trade. We would expect a higher propensity to export from affiliates in the case of vertical integration compared to horizontal integration. It can not simply be assumed that a general expansion of production abroad stimulates more trade between multiple countries. To clarify the relationship between foreign investment and trade, we rather need to analyze the structure of multinational firms, and how they relate to the characteristics of individual countries and affiliates.

Direct investment presupposes firm-specific advantages. The most commonly considered source of such advantages is R&D, which has been shown to be positively related to the internationalization of firms (Horst, 1972; Bergsten et al., 1978; Swedenborg, 1979; Lall, 1980). Furthermore, multinational firms have been found to increase exports from developing host countries particularly in R&D intensive industries, where firms and home countries have the most pronounced comparative advantages (Blomström et al., 1988; Lipsey et al., 1990). It has not been considered how R&D intensity affects firms' tendency to export from foreign affiliates, however. Vertical integration can be said to be motivated by the internalization of markets for intermediate products, which channel embodied knowledge that may emanate from various sources of firm-specific assets, including natural resources at home or R&D. Horizontal integration is directly motivated by the internalization of markets for intangible assets, and knowledge transfers are primarily disembodied, or associated with the training of employees. Thus, R&D is important for both kinds of integration,

but may play somewhat different roles in the two cases.

Horizontal integration requires a high ability to adapt operations to the special features of each particular market. Competitiveness partly hinges on the accumulation of experience from operating in different countries. This, together with the fact that horizontally integrated affiliates substitute for production in the parent company rather than complement it, suggests that firms which emphasize horizontal integration should be present in a large number of markets, and have a relatively large share of their total production abroad.

The choice of integration should also be influenced by country- and affiliate-specific factors. The larger the host economy, the more favorable the opportunities for economies to scale at the plant level, according to Kravis and Lipsey (1982). This can not be taken for granted, however, since economies to scale do not necessitate a large domestic market when affiliates have the opportunity to export. The income level in the host country is associated with the quality of infrastructure, and should also indicate the skill of the labour force as well as political stability. A high-income country should consequently be a relatively good location for specialized production in advanced operations. This is highly applicable to Swedish multinationals, which mostly produce differentiated goods and target developed markets. Industries based on raw materials in the home country may display another pattern, however.

Labour costs, on the other hand, should be negatively related to production for exports. Unfortunately, there are considerable measurement problems, since labour is a highly diversified factor whose remuneration is related to competence and skills. There is consequently no reason to expect that actually observed wages would explain the pattern of production activities, which has also been confirmed in our data. Alternatively, value added per worker may play a role, since a firm can be expected to concentrate operations in those locations where productivity is the highest. On the other hand, specialization will in itself occur in low-value added as well as high-value added activities, which speaks for an ambiguous influence.

Finally, the form of international organization will be influenced by the conditions for trade. Low transport costs and small legislated barriers facilitate international specialization of production. To the extent that trade policies have gradually been liberalized, we would expect increasingly favorable conditions for vertical integration. For the Swedish multinationals, the integration of the European Community should have been particularly important in this respect, especially in the late 1980s when firms restructured their activities to take advantage of future opportunities in the Single Market. Here, there may have been improved opportunities for exports from horizontally integrated firms as well, as the boundaries of the perceived local market may stretch beyond the boundaries of the host country itself. A possible counteracting trend may arise from the use of various overt or covert investment incentives in many countries to attract desirable investment projects, which may stimulate certain kinds of production in each national market.

The next section presents a number of specific hypotheses, which subsequently are examined empirically.

3. Hypotheses

As already stated, the way foreign affiliates are integrated with the rest of a multinational firm should strongly influence the connection between direct investment and trade. The present study is concerned with explaining the variation in the propensity of foreign affiliates to export, i.e. size of exports relative to the total sales of affiliates. The bulk of these exports has gone to other countries than the home country.[5]

The starting point for the analysis is the view that exports from affiliates are due to an international specialization of production, and are mainly related to vertical integration in production. Horizontal integration, on the other hand, should rather

---

[5]   Exports back to Sweden have not been excluded, as there is no principal difference between exports to third countries and to the home country. The share of total exports from affiliates which goes back home has been small throughout, although it has increased over time from some 10 per cent in 1965 to 25 per cent in 1990.

account for limited exports, since affiliates primarily produce for the local market. Examinations of our data, reported in Andersson et al. (1993), indicate an extensive presence of both kinds of integration in the Swedish multinationals. However, we cannot directly observe which firms are vertically and which are horizontally integrated. Many affiliates display elements of both kinds of integration, which also applies to company groups as a whole. We consequently analyze the variation in exports from affiliates with the help of proxy variables that are expected to be associated with either of the two forms of organization, or with a combination of them.

Hypotheses regarding the determinants of the propensity of affiliates to export are formulated on three levels, the multinational firm as a whole, the specific affiliate, and the host country. To these are added dummies which capture changes over time. A few factors have been included in the estimation although ambiguous influences are expected, since examining them may be helpful for understanding the whole picture of organization. Descriptive statistics for the explanatory variables, together with the hypothesized impacts, are reported in Table 1. As no data are available for firms based in other countries than Sweden, we cannot consider hypotheses related to home country characteristics. This matter will be returned to in the final section.

Firm-variables:

The number of countries with affiliates (x_1); It is commonly argued that a firm's establishment of operations in many foreign markets would stimulate trade between them. Vertical integration should involve a limited number of producing affiliates, however, while a large number should rather be associated with horizontal integration. Thus, a negative impact is expected on the propensity of affiliates to export.

International experience (x_2); The variable is measured as the number of years since the first foreign affiliate was established. For vertically integrated firms, the

Table 1: Descriptive statistics and hypothesized effects

	Variables	Mean	Median	Std. dev.	Expected sign in estimation
y	Propensity to export	0.23	0.08	0.31	
Firm-specific variables					
x_1	Number of countries	11.58	11	8.06	-
x_2	International experience (*)	3.38	3.76	1.03	+
x_3	Multinationality	0.46	0.47	0.24	-
x_4	R&D intensity	0.04	0.02	0.04	-
x_5	Natural resource	0.12	0	0.33	-
Affiliate-specific variables					
x_6	Size of affiliate (*)	5.07	5.08	1.39	+
x_7	Age of affiliate (*)	2.17	2.30	1.14	-
x_8	Mode of establishment	0.51	1	0.50	-/+
x_9	Value added/employee	75.58	70.45	55.65	-/+
Country-specific variables					
x_{10}	Market size (*)	6.36	6.26	1.45	-
x_{11}	Income level (*)	9.91	10.22	0.83	+
x_{12}	European Community	0.54	1	0.50	+
Time variables					
t_1	Time dummy for 1978	0.24	0	0.43	+
t_2	Time dummy for 1986	0.31	0	0.46	+
t_3	Time dummy for 1990	0.23	0	0.42	+

(*) The variable is used in logarithmic form in the estimations.

coordination of activities in different countries should improve over time, accounting for growing exports. For horizontally integrated firms there should not be any significant impact. A positive effect is consequently expected on the whole.

Multinationality (x_3): The variable is measured as the proportion of total assets which belongs in the foreign parts of a firm. The previous literature unequivocally argues for

a positive influence on exports from affiliates, which indeed can be expected to apply in the case of vertically integrated firms. Vertical integration should be less conducive to multinationality than horizontal integration, however, because affiliates substitute for activities at home rather than complement them in the latter case. Thus, we here favor a negative impact.

R&D intensity of the parent company (x_4); R&D is a key factor motivating both kinds of organization. However, countries are known to favor local production by multinational firms particularly in technology-intensive industries, in order to obtain spillover effects on domestic industry, which should stimulate horizontal integration.[6] It is also possible that, in the case of vertically integrated firms, high R&D intensity in the parent company motivates exports from home as a means to channel embodied knowledge, rather than exports from affiliates. A negative impact is consequently expected.

Natural Resource Industry (x_5); A dummy is here used for sectors based on natural resources. Drawing on country-specific input goods located at home, a firm should export relatively little from units in other countries, accounting for a negative influence on the dependent variable.

Affiliate-variables:

Size of affiliate (x_6); Economies to scale at plant level should be associated with an international specialization of production, and greater exports from affiliates. Thus, we expect the size of an affiliate to be positively related to its propensity to export.

Age of affiliate (x_7); Age is measured as the number of years since it was first established. Due to trade liberalization in industrialized countries in general, and

---

[6]   For example, technical barriers to trade and discrimination in public procurement have been found to be particularly important in R&D intensive industries, see Nerb (1988) and Atkins (1988).

regional integration of the most important markets in particular, the conditions for exports have improved over time. More newly established affiliates should rather be more export oriented, accounting for a negative influence.

Mode of establishment (x_8): The variable is measured as a dummy taking the value 1 if an affiliate has been established through acquisition of an already existing company, and zero otherwise. As a firm should enjoy special advantages in its own market, acquisitions are likely to be motivated particularly by access to local markets. This factor speaks for a negative influence on the propensity to export. On the other hand, there has been a growing dominance of acquisitions over greenfield operations in recent years (UN, 1992; Andersson et al., 1992). In analogy with the preceding variable, this suggests that acquisitions would be more oriented towards exports than greenfield operations. An ambiguous influence can consequently be expected.

Value added per employee (x_9): With a specialization of a firm's international operations, value added may be either high or low depending on the function of the specific affiliate. Furthermore, we do not know whether vertically or horizontally integrated companies have the highest value added on average. Thus, the variable is expected to exert an ambiguous influence.

Country variables:

Size of the host country market (x_{10}): Since economies to scale are more important in vertical integration, it has been noted above that a large market may be particularly attractive for vertical integration. A large economy has indeed been found to stimulate exports from direct investment. Since in our case the dependent variable is the *propensity* of an affiliate to export, however, a large market should on the whole account for a relatively great emphasis on the local market. Hence, a negative effect is expected.

Income level of the host country (x_{11}); Higher income suggests more developed infrastructure, a more skilled labour force and political stability, making a country an attractive location to concentrate production in. This speaks for the attraction of vertically integrated activities, while horizontally integrated ones rather are present in each market. Thus, affiliates in high income countries should have a relatively high propensity to export.

European Community (x_{12}); A dummy is used for affiliates in the European Community, which should have a higher export propensity as the ongoing integration process facilitates trade across national borders. Except for better prospects for a concentration of production in certain locations, horizontally integrated firms may also perceive the "local" market as stretching beyond the borders of the host country itself. Thus, we expect a positive influence.

Time variables:

Dummies for observations in the years 1978 (t_1), 1986 (t_2) and 1990 (t_3); The conditions for vertical integration improve with trade liberalization, which leads us to expect that the time dummies exert increasing, positive impacts. On the other hand, new forms of protectionism have grown in recent years during the yet unsuccessful negotiations of the Uruguay Round, which might exert a counteracting influence.

4. Data and estimation

The estimation has been performed on data collected by the Industrial Institute for Economic and Social Research (IUI). Questionnaires have been sent out about every fourth year since 1965 to all Swedish multinational firms in manufacturing with at least one foreign affiliate, and the response rate has mostly exceeded 90 per cent.[7] The answers from 1974, 1978, 1986 and 1990 are included in this study, which

---

[7] The only exception is 1990, for which about 85 per cent of the answers have yet been obtained.

examines all affiliates with production, while sales offices have been left out.

Table 2 surveys the average propensity of affiliates to export in some major regions, and its development over time. As can be seen, there are considerable differences, with high figures in the European Community and EFTA, and low ones in developing countries. It can be observed that Swedish multinationals, in contrast to e.g. U.S. and Japanese ones, have not located production in developing countries in order to supply world markets. The changes over time are somewhat ambiguous, although positive trends dominate in Europe. To examine our hypotheses in detail, however, we must study the variation between and within companies.

Because many affiliates do not export abroad (26% of our observations), it is appropriate to apply a Tobit - censored regression - model for the estimation (Tobin, 1958). The model is defined as

$$y_i = \alpha + \beta'x_i + u_i \qquad\qquad\qquad if\, RHS > 0$$
$$y_i = 0 \qquad\qquad\qquad\qquad\qquad\qquad Otherwise$$

Table 2: Exports as a share of total sales in affiliates, average for different groups of countries, per cent

REGION	1974	1978	1986	1990
EC	31.0	34.3	38.3	37.0
EFTA	24.1	24.8	25.8	33.8
Other DCs	14.3	10.3	7.9	11.1
LDCs	6.0	9.1	11.8	8.6

where y_i is the observed propensity to export, x_i is a k x 1 vector including observations of the independent variables, β is the k x 1 vector of parameters to be estimated, and u_i are the residuals, assumed to be independent and normally distributed with zero mean and a common variance. The parameters are estimated by maximizing the log-likelihood function with a ridge-stabilized Newton-Raphson algorithm. The estimates of the standard errors are computed from large sample normal approximations, using the observed information matrix.

The number of independent variables may be suspected to account for problems with multicollinearity. A correlation should particularly arise between number of countries (x_1), international experience (x_2) and multinationality (x_3), between age (x_7) and mode of establishment (x_8), and between income (x_{11}) and the EC (x_{12}). This turned out to be the case particularly for the first three variables. Thus, a second complementary estimation has been performed with certain variables excluded.

5. Results

The results of the estimation with all variables included are given in the first column, under "model I", in Table 3. The outcome is highly satisfactory, with most variables significant at the 1% level, and a high overall Chi-square value. Concerning the firm-specific variables, number of affiliates, R&D intensity and natural resource industry all display the expected negative impacts on the propensity to export. In addition, international experience exerts the expected positive impact on the 10% level. For multinationality, a negative impact is obtained, although it is not significant. Thus, there is no convincing evidence that a high degree of internationalization is associated with horizontal integration and limited exports from affiliates. Neither is there any evidence for the conventional perspective that high multinationality would stimulate exports from affiliates.

Of the affiliate-specific factors, size and age exert the expected positive and negative impacts respectively, although the latter is significant only at the 5 per cent

Table 3: Estimation results

Variable	Variable Names	Model I	Model II
	Intercept	-1.281*** (0.1317)	-1.205*** (0.1228)
x_1	Number of countries	-0.006*** (0.0017)	-0.004*** (0.0012)
x_2	International experience	0.029* (0.016)	-
x_3	Multinationality	-0.037 (0.0449)	-0.003 (0.0418)
x_4	R&D intensity	-0.587*** (0.2107)	-0.502*** (0.2015)
x_5	Natural resource intensive	-0.201*** (0.0295)	-0.183*** (0.0284)
x_6	Size of affiliate	0.067*** (0.0071)	0.070*** (0.0069)
x_7	Age of affiliate	-0.021** (0.0093)	-0.023*** (0.0080)
x_8	Mode of establishment	0.007 (0.0189)	-
x_9	Value added/employee	-1.8 E-4 (1.8 E-4)	-
x_{10}	Market size	-0.094*** (0.0068)	-0.095*** (0.0066)
x_{11}	Income level in host country	0.169*** (0.0134)	0.165*** (0.0125)
x_{12}	European Community	0.147*** (0.0175)	0.151*** (0.0171)
t_1	Time dummy for 1978	0.011 (0.0252)	0.021 (0.0245)
t_2	Time dummy for 1986	0.061** (0.0245)	0.060** (0.0601)
t_3	Time dummy for 1990	0.055** (0.0270)	0.044* (0.0260)
	Observations:	1888	1962
	Non censored values:	1402	1448
	Left censored values:	486	514
	Chi-square value:	433.2	453.4
	Prob. > Chi-square:	0.001	0.001

*** 1%-level ** 5%-level * 10%-level of significance, standard errors in parentheses

level. Mode of establishment and value added, for which ambiguous influences were expected, are both insignificant at the 10 per cent level. Turning to the country-specific variables, all three are significant at the 1 per cent level and with signs as expected, i.e. the propensity to export from affiliates falls with market size but increases with income level, and is relatively high in the European Community. Regarding the time-dummies, finally, those of 1986 and 1990 are clearly positive and significant. While the estimated coefficients are much larger than for 1978, no increase is recorded for 1990 as compared to 1986. Thus, there is no support for a general increase in the propensity to export from affiliates in the late 1980s.

As mentioned, there may be certain problems due to multicollinearity. As can be seen from Appendix 1, (x_1), (x_2) and (x_3) are moderately correlated. To check the robustness of the results, and examine whether multinationality is insignificant due to collinearity, a second estimation has been performed with international experience left out. In this we also exclude mode of establishment (x_8), which is insignificant in model I and *a priori* expected to be correlated with age (x_7), as well as value added per employee (x_9) - the variable with the least explanatory power.

The results of the second estimation are given in the right column of Table 3 under "model II". As can be seen, none of the estimates are more than marginally affected. Multinationality retains its negative sign, but remains insignificant. A slight improvement is recorded concerning the impact of the age-variable, which now becomes significant at the 1%-level.

Finally, certain problems may arise due to simultaneity. In particular, a high propensity to export may be expected to exert a reverse impact on the size of affiliates. As implied by the negative impact of market size on the propensity to export, this is not a major problem, however. The size of affiliates increases with the size of the host country market as well as with exports, but a larger market leads to a relatively small propensity to export from an affiliate.

16

6. Concluding Remarks

This paper refutes the idea of a simple relationship between more international operations by multinational firms and expanding trade between host countries. More than three-fourths of the exports from Swedish affiliates have gone to third countries. The variation in the propensity of affiliates to export demonstrates a strong connection with the organization of firms. It has been argued that vertical integration is associated with an international specialization of operations, and relatively more exports from affiliates. Horizontal integration, on the other hand, is associated with relatively little exports.

However, it is difficult to directly observe forms of organization, and individual firms as well as affiliates may display various combinations. Thus, the study has explained the variation in exports from affiliates by using proxy variables which can be related to vertical or horizontal organization in various ways. Of the firm-variables, a high export propensity is associated with production in few countries, low R&D intensity in the parent company and absence of input goods that are specific to the home country. The same applies to affiliate-characteristics such as large size and low age. Of the host country variables, a high export propensity is related to small market, high income and location in the European Community. The propensity to export also increased over time up to 1986, but no further increase has been recorded as of 1990.

The results may differ from what would be obtained for firms from dissimilar home countries, and particularly those that are less oriented towards manufacturing of differentiated products. Countries which are large, or directly involved in regional integration processes such as that of the European Community, may also display different patterns. Still, this first inquiry into the determinants of foreign affiliates to export should provide some insights of general value. The connections between the expansion of direct investment and the pattern of international trade is not straight-forward, but will depend on the kind of integration adopted by firms, which in turn is

influenced by the characteristics of firms themselves, affiliates, countries and trade policies.

Further work is required on the relationship between internationalization and the organization of firms. In this context it may be worth while to explore other measurements of multinationality than the one used here, such as proportion of value added abroad or internationalization of research activities. There is also a more general need to further analyze the determinants of vertical and horizontal integration, and how these forms of organization relate to each other. The impacts of multinational firms on trade, production and welfare around the world are crucially dependent on how international operations are organized.

References

Andersson, T., T. Fredriksson & Z. Leung. 1993. Distinction between Intermediate and Finished Products in Intra-Firm Trade, Working Paper 378. Stockholm: The Industrial Institute for Economic and Social Research (IUI).

Andersson, T., N. Arvidsson & R. Svensson. 1992. Reconsidering the Choice between Takeover and Greenfield Operations, Working Paper 342. Stockholm: The Industrial Institute for Economic and Social Research (IUI).

Atkins, W.S. 1988. The Cost of Non-Europe in Public Sector Procurement. *Research on the Cost of Non-Europe, Basic Findings*, Vol. 1. Commission of the European Communities.

Bartlett, C.A. & S. Goshal 1989. *Managing across Borders: The Transnational Solution*. Boston: Harvard University Press.

Bergsten, C.F., T. Horst & T.H. Moran. 1978. *American Multinationals and American Interests*. Washington: Brookings Institution.

Blomström, M. & R.E. Lipsey. 1990. Foreign Firms and Export Performance in Developing Countries: Lessons from the Debt Crisis. NBER Working Paper No. 3412.

Blomström, M., I.B. Kravis & R.E. Lipsey. 1988. Multinational Firms and Manufactured Exports from Developing Countries. NBER Working Paper No. 2493.

Casson, M.C. & Associates. 1986. *Multinationals and World Trade: Vertical Integration and the Division of Labor in World Industries*. London: Allen & Unwin.

Caves, R.E. 1971. International Corporations: The Industrial Economics of Foreign Investment. *Economica*, 38, February: 1-27.

Hedlund, G. 1986. The Hypermodern MNC - A Heterarchy? *Human Resource Management*, 25, 1: 9-35.

Horst, T. 1972. The Industrial Composition of U.S. Exports and Subsidiary Sales to the Canadian Market. *American Economic Review*, 62: 37-45.

Kogut, B. 1990. Internal Sequential Advantages and Network Flexibility. In Bartlett et al., eds., *Managing the Global Firm*. London: Routledge.

Kravis, I.B. & R.E. Lipsey. 1982. The Location of Overseas Production and Production for Export by U.S. Multinational Firms. *Journal of International Economics*, 12: 201-223.

Kume, G. & K. Totsuka. 1991. Japanese Manufacturing Investment in the EC: Motivations and Locations. In Sumitomo-Life Research Institute with Masaru Yoshitomi, *Japanese Direct Investment in Europe*. Avebury: Billing & Sons.

Lall, S. 1980. Monopolistic Advantages of Research Activity by U.S. Multinationals. *Oxford Economic Papers*, 32: 102-22.

Lipsey, R.E., M. Blomström & I.B. Kravis. 1990. R&D by Multinational Firms and Host Country Exports. In Evenson, R. & G. Ranis, eds., *Science and Technology. Lessons for Development Policy*. Boulder: Westview Press.

Markusen, J.R. 1984. Multinationals, Multi-Plant Economies, and the Gains from Trade. *Journal of International Economics*, 16: 205-226.

Nerb, G. 1988. The Completion of the Internal Market. A Survey of European-Industry's Perception of the Likely Effects. *Research on the Cost of Non-Europe, Basic Findings*, Vol. 3. Commission of the European Communities.

Pearce, R.D. 1982. Overseas Production and exporting Performance: An Empirical Note. *Discussion Papers in International Investment and Business Studies*, 64. University of Reading.

Porter, M.E. 1991. From Competitive Advantage to Corporate Strategy. In *Michael E. Porter on Competition and Strategy*. Harvard Business Review Paperback No. 90079.

Swedenborg, B. 1979. *The Multinational Operations of Swedish Firms: An Analysis of Determinants and Effects*. Stockholm: The Industrial Institute for Economic and Social Research (IUI).

Tobin, J. 1958. Estimations of Relationships for Limited Dependent Variables. *Econometrica*, 26: 24-36.

United Nations (UN). 1992. *World Investment Report: Transnational Corporations as Engines of Growth*, New York.

Vernon, R. 1966. International Investment and International Trade in the Product Cycle. *Quarterly Journal of Economics*, 80: 190-207.

Vernon, R. 1979. The Product Cycle Hypothesis in a New International Environment. *Oxford Bulletin of Economics and Statistics*, 41: 255-67.

Wernerfelt, B. & C. Montgomery. 1988. Tobin's q and the Importance of Focus in Firm Performance. *American Economic Review*, 78: 246-250.

Appendix 1: Correlation matrix

	Y	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9
x_1	-0.091									
x_2	-0.084	0.776								
x_3	-0.008	0.478	0.547							
x_4	-0.083	0.166	0.292	0.087						
x_5	-0.062	-0.208	-0.220	-0.333	-0.229					
x_6	0.049	0.260	0.368	0.253	0.131	-0.001				
x_7	-0.054	0.205	0.409	0.197	0.156	-0.090	0.371			
x_8	0.071	0.065	-0.043	0.023	-0.096	0.072	-0.025	-0.386		
x_9	-0.009	-0.026	-0.027	-0.021	0.074	0.052	-0.111	0.025	-0.016	
x_{10}	-0.019	-0.017	0.016	0.038	0.072	-0.002	0.040	-0.136	0.141	0.230
x_{11}	0.149	0.002	-0.172	-0.077	-0.067	0.067	-0.174	-0.199	0.241	0.332
x_{12}	0.190	0.041	-0.080	0.006	-0.110	0.093	0.033	-0.058	0.196	0.095

	x_{10}	x_{11}
x_{11}	0.466	
x_{12}	0.199	0.265