Birgitta Swedenborg

The multinational operations of Swedish firms. An analysis of determinants and effects.

The Industrial Institute for Economic and Social Research. Stockholm.

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The Multinational Operations of Swedish Firms

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An Analysis of Determinants and Effects

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Preface

International trade and investment play an important rôle in the Swedish economy. They have also occupied a central place in the research at the Industrial Institute for Economic and Social Research (IUI). The present study represents a systematic inquiry – empirical as well as theoretical – into both of these areas. It focuses on the interrelationships between international trade and investment by national firms, phenomena which lie at the heart of the ongoing controversy regarding the rôle and impact of multinational companies on national economies.

The work has been carried out at the IUI, but this publication also constitutes the author's doctoral dissertation in economics at the University of California, Los Angeles, which was submitted earlier this year. We therefore wish to thank the members of the department of Economics at UCLA, especially Professor Axel Leijonhufvud and Professor Edward Leamer, who, in different ways, have contributed to this study.

Stockholm in November 1979
Gunnar Eliasson

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This study, which is my doctoral dissertation in economics at the University of California, Los Angeles, has been financed by, and carried out at, the Industrial Institute for Economic and Social Research (IUI), Stockholm, Sweden.

Time and distance absolve the members of my thesis committee at UCLA of much direct responsibility for this study. Still, I am personally indebted to Professor Axel Leijonhufvud, Chairman of this committee, for his intellectual and moral support, friendly prodding, and indispensable help in seeing this thesis to its completion. I also want to thank Professor Edward Leamer, UCLA, for valuable suggestions on the econometric parts and Professor Robert E. Lipsey of the National Bureau of Economic Research for his interest in my work and the ideas and improvements he has contributed in discussion and in correspondence.

At closer quarters, I want to thank Docent Göran Eriksson at IUI, who by his critical reading of earlier manuscripts has much improved the clarity of thought and presentation in the final version. Special thanks are due to Dr. Bo Axell, IUI, and Professor Jim Albrecht, visiting from Columbia University, for their help in clarifying the issues in Chapter 7 and with Appendix A. I am also indebted to Kerstin Wennberg, who has provided competent programming assistance, and to Alice Nilson, who has cheerfully done the typing.

I alone, however, bear full responsibility for the opinions, interpretations and shortcomings of this work.

Stockholm in November 1979

Birgitta Swedenborg

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ABSTRACT

The multinational operations of national firms has been a subject of intensive study in the past decade or so. It has challenged international trade theory to explain the large two-way factor movements across national borders occasioned by the multinational corporation. It has posed a challenge to policy makers having to decide whether to allow or restrain the rapidly growing foreign operations of national firms.

The present study does not differ from earlier studies so much in the questions that it seeks to answer as in the way it goes about answering them. Basically, the questions asked are 1) what determines why national firms produce abroad, and 2) what is the effect on home country trade of allowing foreign production?

The empirical analysis uses unique census data on Swedish manufacturing firms and their foreign affiliates. This makes it the only study in which hypotheses regarding the determinants of international production have been tested on data for the outward investment of a country other than the U.S. and one of a few studies where many of these hypotheses have been tested on individual firm data.

How valid are hypotheses developed mainly on the basis of the U.S. experience for the foreign operations of firms in another country? Comparisons of the relative size and pattern of outward investment by the U.S., the U.K.,and Sweden reveal differences which are due to differ-

ences in investing country characteristics such as country size, traditional commercial ties with foreign countries,and comparative advantage in production, where the latter is shown to also affect "comparative advantage" in producing abroad.

Hypotheses regarding the determinants of international production are tested by regression analysis on cross-sectional data for Swedish firms in 1974. The results show that the (firm-specific) competitive advantage of Swedish foreign investors in foreign markets is based mainly on high labor skills, while a high R&D intensity appears to bias firms toward exporting and against foreign production. The choice between exports and foreign production depends on industry characteristics affecting location, such as capital intensity and scale economies in production. Different host country characteristics bring out the influence of "market proximity" - a euphemism for distance related costs - on the location of production.

Analysis of the influence of the firm's domestic size on the volume of foreign production does not support the common notion that larger firms have a higher propensity to produce abroad than small firms and that the determinants of foreign production should, on that account, be sought in oligopolistic market conditions.

One of the most important determinants of inter-firm differences in both the relative and absolute volume of foreign production is the length of time firms have produced abroad. It shows the influence of dynamic-historical factors on the current state of affairs. It also reveals that domestic and foreign production do not grow at the same rate over time and suggests that, once started, growth through foreign production typically exceeds domestic growth.

Finally, we address the policy issue of what the effect on exports is of allowing foreign production. The partial effect of exogenous changes in foreign production on the firm's total exports and on, its exports of complementary and substitute products, is estimated by two-stage-least squares. The results show that there is, on average, a small positive net effect on the firm's exports of allowing foreign production, a finding which removes one motive for the current Swedish regulation of the free flow of direct investment capital.

Chapter 1

Introduction

1.1 Background and purpose

Foreign investment by Swedish manufacturing firms is by no means a recent phenomenon - there are still manufacturing affiliates abroad which were started in the 19th century - but it is a phenomenon which is assuming increasing importance in the Swedish economy. In the period 1960-74, when manufacturing employment in Sweden was more or less constant, employment in foreign manufacturing affiliates of Swedish firms more than doubled. By 1974 employment in foreign manufacturing affiliates amounted to 24 per cent of manufacturing employment in Sweden. That means that Swedish manufacturing industry is more multinational than its better known counterpart in the United States.

The rapid growth of Swedish direct investment has triggered concern regarding the possible implications of the foreign operations of Swedish companies for the Swedish economy. Initially, concern centered around the likely effects of the direct investment outflow on the balance of payments. As a consequence, permission from the Central Bank to invest abroad, required under the Swedish foreign exchange regulation, became increasingly contingent on the ability of companies to demonstrate that foreign investment would not have an adverse effect on the balance of payments, i.e., the investment would yield a sufficiently rapid and high return flow of earnings or would boost Swedish exports.

Subsequently, interest has come to focus on the implications of foreign expansion by Swedish firms on the level and pattern of employment in Sweden. The ensuing debate involved organized labor, on the one hand, arguing that foreign investment entailed export of job opportunities and the investing companies, on the other hand, claiming that foreign investment was necessary in order to maintain, or increase, employment in Sweden. The controversy eventually spilled into other areas such as the potential for tax evasion, currency speculation (or hedging), and, most recently, for immunity from proposed labor influence in the management of Swedish firms by companies with operations in more than one country. The debate in Sweden over direct investment and multinational companies, therefore, has paralleled that in some other investing countries, most notably the United States and Great Britain.[1]

The present study was started to shed light on some of the above issues using Swedish data. It focuses on the multinational operations of the mining and manufacturing sector, specifically, on its foreign manufacturing activities.[2] This focus is motivated by the fact that invest-

[1] The foreign exchange regulation will be reviewed and evaluated for the first time since it was adopted in 1939 by a newly appointed government commission. (The regulations have been changed successively over the years but there has never been a fundamental appraisal of its functioning before now.) The effects of the operations of multinational firms on the Swedish economy was the subject of one recent government study (Lundgren [1975]), and will receive renewed attention in a newly started one. The present study fits in well with, and, I hope, makes a contribution to, the problems to be investigated in these other studies.

[2] According to the most general definition of multinational companies they include all firms which own and control productive activities abroad. This definition is consistent with the equally broad definition of direct investment in the balance of payments, i.e., investment in foreign firms

Cont.

ment in manufacturing makes up the bulk of Swedish direct investment abroad and, furthermore, that the location of manufacturing activities abroad gives rise to a substantially different set of questions from the setting up of a distribution and service network for Swedish exports. Both the motives for and the effects of foreign manufacturing acitivities differ from those of foreign sales and service activities.[1]

The analysis emphasizes the relationship between foreign manufacturing investment and exports. The reason is that the determinants of foreign manufacturing cannot be isolated from what determines total foreign sales and the choice between exports and foreign production in serving foreign markets. This applies to firms establishing production abroad to serve foreign markets. For firms producing abroad for sale in the home country, a very small proportion of Swedish foreign investors, the choice is between imports and domestic production in serving the domestic market. In either case, production at home and abroad are substitute sources of supply and what affects one will affect the other.

Furthermore, the relationship between direct investment and exports lies at the heart of many of the potential effects one might want to consider. It is crucial to an evaluation of the effects of direct investment on, e.g.,the balance of payments, the level and pattern of employment

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Cont.

over which the investor may exercise some ownership control. Foreign investment which is not associated with such control, i.e., portfolio investment, is all but ruled out under the Swedish foreign exchange laws.

[1] This does not mean that the two are unrelated. A typical sequence of events might be for firms to first set up their own sales affiliates abroad and then increase their foreign involvement by locating production activities abroad.

in Sweden, and the gains from international specialization and exchange.[1]

The purpose of this study, then, is to analyze the determinants of foreign production by Swedish manufacturing firms and the implications of such production for Swedish exports. Some of the questions that it seeks to answer are: What determines whether, and how much, firms produce abroad? What are the characteristics of these firms? What role is played by production costs in different countries and by trade barriers in determining their locational choice? What part does growth through foreign production play in the overall growth of firms? And what would be the effect on exports of controls on foreign production? Is the relationship between foreign production and exports, on balance, one of substitution or of complementarity?

1.2 The approach and scope of the study

The empirical analysis is based on the following view regarding the determinants of foreign production by firms. Holding industry characteristics constant, the competitive advantage of a firm depends on a firm-specific knowledge advantage. Such an advantage helps explain size differences between firms in a given industry both at home and abroad. The firm's choice between foreign and domestic production, on the other hand, depends on industry and country characteristics affecting location, such as the role of scale economies in production, differences in relative factor

[1] The importance of the effect of direct investment on exports for the overall balance of payments was brought out clearly in the reports by Reddaway [1967, 1968] on United Kingdom direct investment and by Hufbauer-Adler [1968] on United States direct investment. With the most "favorable" assumptions regarding the effects of foreign investment on manufacturing exports direct investment was found to have a "positive" effect on the balance of payments, but this was wiped out entirely by slightly altered assumptions. Of course, the balance of payments is no goal in itself. From a welfare point of view the important consideration is the effect on the level and distribution of income.

prices between countries, trade barriers, etc.

However, in analyzing inter-firm differences in the relative volume of foreign sales and production, it is necessary to allow for alternatives to geographic expansion, viz., diversification into other product markets. It is necessary also to allow for the fact that it takes time to grow large and that, moreover, the firm need not grow at the same rate at home and abroad. The hypothesis advanced is that domestic growth precedes growth in foreign markets and that the relative volume of foreign production depends critically on the length of time the firm has been producing abroad.

The partial effect on the firm's own exports of controls on foreign production cannot be determined on a priori grounds. Both substitution and complementary effects are conceivable. A substitution effect arises with respect to exports of the same goods as are produced abroad, while complementarity effects may be present with respect to the firm's other products. An indirect positive effect on exports of allowing foreign production would result to the extent that foreign production enhances the firm's overall competitive position.

The hypotheses regarding inter-firm differences in the relative volume of exports and foreign production are tested by means of regression analysis on cross-sectional data for Swedish foreign investors. The cross-sections are across firms and across operations in different countries. They also involve comparisons between firms which produce abroad and those which do not.

The basic source of data in the empirical analysis is information collected at the Industrial Institute for Economic and Social Research (IUI) in two census operations. It covers all Swedish manufacturing firms which had foreign affiliates in any of the census years 1965, 1970, or 1974 and includes information on the Swedish parent groups and on their foreign affiliates.[1]

Throughout most of the empirical analysis the focus is on the individual firm. Although this analysis, clearly, has macro-economic implications, an analysis of the determinants of the aggregate flow of direct investment capital, as well as an evaluation of the overall effects of international direct investment on the Swedish economy, is, for the most part, outside the scope of this study.

1.3 Relationship to earlier studies

There is as yet no theory of international direct investment which may be called the theory. The rapidly growing literature on the topic has produced a number of interesting hypotheses about the determinants of direct investment, drawn from nearly every field of economic theory, and a wealth of casual observations and empirical evidence.[2] Although there is an emerging consensus on the general factors which explain this phenomenon, there is not yet a rigorously formulated and unified theoretical framework.

The contribution of the present study is not to theory. Instead it draws on those parts of received theory which seem most useful in explaining why national firms locate productive activities abroad. The emphasis is on what may be learned from international trade theory and the theory of the firm. This emphasis yields a number of hypotheses about the pattern of foreign investment on the country, industry and firm level.

[1] The data has been presented in some detail in two earlier reports by this author (Swedenborg [1973] and [1976]). The questionnaire forms, definitions used and an account of the scope and methodology of the surveys are presented in Appendix B. Appendix C contains tables of data for 1960, 1965, 1970 and 1974.

[2] See surveys of the literature by Dunning [1973], Hufbauer [1973], Stevens [1973] and Horst [1974].

Most of the hypotheses are by now familiar; some, however, diverge from prevalent notions.

In particular, the view presented here owes much to the contributions of Hymer [1960], Kindleberger [1969], and Caves [1971], who joined industrial organization theory with the theory of international trade to explain international direct investment and brought out the significance of industry- or firm-specific factors. But it departs from those theories in not seeing an oligopolistic market structure as an important determinant of the internationalization of national firms. Rather, it emphasizes the role of firm-specific knowledge in explaining the differential growth and size of firms in general and the fact that growth eventually, depending on locational factors, may involve international operations. The "oligopoly theory" of international investment largely begs the question of what made some multinational companies big in the first place and does not explain why relatively small firms become multinational.

This study contributes to our knowledge of international investment in the following respects. First, it is the first comprehensive empirical analysis of Swedish manufacturing investment abroad, which uses Swedish data to test theories previously developed on the basis of the U.S. experience (e.g., the above-mentioned theories of Hymer, Kindleberger, and Caves). Second, it is the only study in which different aspects of the international operations of national firms have been analyzed on the basis of uniform data. For example, it is one of the few studies in which theories of the determinants of international investment by <u>firms</u> have been tested on individual firm data rather than on aggregated data. Third, it gives estimates of the effects of foreign production controls on exports of Swedish fir which are comparable with the results from similar analyses on U.S. data. By using alternative techniques of estimation on the Swedish data, we show that the method used in earlier econometric analyses tends to overestimate the positive effect of foreign production on exports.

The significance of an empirical study of Swedish direct investment derives from the fact that most empirical work on the determinants of outward investment so far has been based on data for the United States.[1] The United States accounts for the major share of international direct investment and for that reason alone it is natural that it should figure prominently in empirical work. From a practical point of view, a more important reason has probably been the availability of relatively detailed data on U.S. foreign investment and the near lack of such data on foreign investment by other countries. The result has been that theories of the determinants of foreign investment tend to be formulated on the basis of observations of the pattern of U.S. direct investment or of the characteristics of the often very big U.S. multinational companies. It is not clear that these theories are equally applicable to the foreign investment activities of the smaller countries, which, while not a major influence on host countries, are often important relative to the economies of the investing countries. Comparative study of smaller countries is, therefore, an important step toward finding a general theory of foreign investment.

The second feature, which distinguishes this study from much previous empirical work, is that it is based on comprehensive micro data, i.e., in-

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[1] Studies on inward foreign investment have, however, been made for a number of countries, including Sweden. Host country studies lend themselves to answering slightly different sorts of questions from those of investing country studies. Typically, host country studies involve comparisons between foreign-owned companies and domestic firms in terms of characteristics and performance. Investing country studies, on the other hand, often relate parent company or home country characteristics to the degree of foreign involvement. An analysis of the internationalization process of firms should preferably be placed in the latter perspective.

formation on the individual firm level covering all (or practically all) foreign manufacturing investment by Swedish firms. Although theories of international direct investment are increasingly couched in terms of the theory of the firm, most empirical studies with a similar orientation as this one have had to rely on published statistics on various levels of aggregation.[1] Others have utilized firm data from sample surveys[2], from which it may be difficult to generalize. Or they have been case studies of specific industries or topics.[3] So far only a few studies have been able to utilize, and then only in part, the extensive body of firm data collected by the U.S. Department of Commerce from U.S. investors.[4] The availability of relatively detailed data on the firm level in the present study has, however, made it possible to test hypotheses regarding the internationalization of national firms not previously analyzed in the literature.

In spirit and design the present study most resembles the work done by Horst [1972, 1974] and Lipsey and Weiss [1969, 1976] respectively on the determinants of foreign production and the effect of foreign production on the exports of U.S. firms. It differs from these studies mainly in attempting to deal with the simultaneity bias present in regression analyses of the exports effects of constraints on foreign manufacturing. This is done by standard econometric techniques (two-stage-least-squares) and does not require on entirely altered approach, as asserted by Frank and

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1 The level of aggregation has varied from 7 to as many as 120 manufacturing industries in cross-sectional analyses. Cf. Horst [1972] and Samuelsson [1977]. Although Horst used 17 industries in his analysis of U.S. direct investment in Canada, he could use only 7 in the corresponding analysis of the United Kingdom.

2 For example, Vernon [1971],who used Fortune's list of the largest 500 companies.

3 For example, Horst's study [1974] of American food processing industry and Finan's study [1975] of the international transfer of semi-conductor technology of U.S.-based firms.

4 Lipsey and Weiss [1976], Horst [1972] and the U.S. Tariff Commission [1973]

Freeman[1] and Tell [1976]. The results do call into question those obtained in earlier single-equation studies.

1.4 Outline of the study

Chapter 2 is a survey of those parts of received theory which are relevant to explaining why foreign investment occurs and why it takes the form of direct investment. Answers to these questions are found in the bringing together of different branches of economic theory, namely, international trade theory, location theory and the theory of the firm.

Chapter 3 is mainly descriptive. It compares the relative volume and the broad pattern of Swedish, U.S., and U.K. direct investment by industry and by country. These comparisons hold some analytical interest also, in that the theories surveyed in Chapter 2 yield predictions regarding the distribution of direct investment by industry and region. Since comparative studies of the outward investment by different countries have not been made before, crude comparisons like the ones made here will serve as a first, rough test of some of these theories.

The relatively general theory presented in Chapter 2 and the aggregated description and analysis in Chapter 3 provide a backdrop to more specific hypothesis formulation and empirical analysis at the individual firm level in Chapters 4-7. Chapter 4 formulates explicit hypotheses regarding inter-firm differences in foreign sales and production. It brings together the determinants of foreign production discussed in Chapter 2 in an analytical framework, where they are seen to simultaneously affect both firm size and the firm's choice between foreign and domestic sales and produc-

[1] I rely here on an unpublished paper by Frank and Freeman. Their book [1978] became available to me after this manuscript was completed. It contains the same basic theme, however.

tion respectively. The explanatory variables are characteristics of firms, of industries, and of countries respectively. The same chapter describes the method of analysis, operational measures of the independent variables, and presents the regression model to be used in the empirical analysis.

The hypotheses formulated in Chapter 4 are tested by means of regression analysis on cross-sectional data for Swedish manufacturing firms in Chapters 5 and 6. Chapter 5 explores what firm, industry, and country characteristics help explain inter-firm differences in the propensity to sell and to produce abroad. The influence of changes in relative wage rates between countries on the change in the propensity to produce in different countries - a question of particular interest in the public debate - is examined in cross-country analyses for single firms with production in many countries. The chapter closes with a comparison with some related studies dealing mainly with U.S. foreign investment.

Chapter 6 examines the factors determining the international involvement of firms further. Specifically, we analyze the influence of the firm's domestic size on the decision to invest abroad in a comparison of "investors" and "non-investors". Also, we explore the relationship between domestic size, on the one hand, and the extent of foreign involvement through exports and foreign production and the degree of product diversification, on the other. Then, to get a more dynamic perspective of the foreign involvement of firms, we examine whether the characteristics of recent entrants to the multinational arena differ from those of older and established investors.

Chapter 7 contains an analysis of the effects controls on foreign production would have on exports from Sweden. It starts with a theoretical discussion of the basis for these effects (substitution and complementarity between exports and foreign production) and of the problem of estimating them, given that foreign production and exports are determined simultaneously. Then, we proceed to estimate the effects of hypothetical foreign production controls on the firm's total exports and on exports which are complementary and non-complementary to foreign production respectively.

Chapter 2

Toward a Theory of International Direct Investment

The questions raised by the expansion of international direct investment and multinational companies do not fit readily into existing theoretical frameworks. International investment is a factor movement which affects the international location of production and thereby the pattern of commodity trade. International direct investment, as opposed to international portfolio investment, however, also implies the internationalization of national firms, i.e., the spreading of their production to other countries via the establishment of foreign affiliates.[1] While the analysis of factor movements belongs in the theory of international trade and investment, an analysis of the internationalization of firms belongs in the theory of the size and growth of firms.

In fact, a theory of international direct investment will have to merge several sets of theories in trying to answer the following questions: Why does foreign investment occur and why does it take the form of direct

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[1] International direct investment is defined as investment in a foreign enterprise in which the investor has some measure of control. It is the control aspect which sets international direct investment apart from other forms of international investment, or portfolio investment. A sufficient but not necessary condition for control is majority ownership of share capital in the enterprise. In practice, most direct investment constitutes investment in majority-owned foreign affiliates.

investment, i.e., why is it associated with ownership control of the foreign activities? Or, formulating the same questions in a way which ties in more clearly with the purpose of this study: Why do firms locate production abroad in preference to production at home for export or import substitution? What enables home country firms to compete with other foreign firms or local producers in producing abroad?

These questions cut across traditional distinctions between separate branches of economic theory. On the one hand, they call for an explanation of what determines the location of production between countries, taking account of the interrelationship between factor and product movements. Such an explanation is given by trade and location theory in a general equilibrium setting where location, factor, and product flows between countries are determined simultaneously. Although these theories are concerned with the determination of trade and location on the national level, the conclusions reached are applicable also to the locational choice made by firms, faced with the possibility of producing in different countries.

On the other hand, the above questions call also for an explanation of what determines the distribution of activities between firms, irrespective of location. Such an explanation must be sought in theories of the firm. The propositions that flow from these theories do not lend themselves easily to empirical testing, but are nevertheless essential to an understanding of the phenomenon. They concern the reasons why activities and transactions sometimes are carried out more efficiently within the firm than in the market place. They also concern the advantages that enable some firms to achieve higher rates of growth, or larger size, in long run equilibrium, than other firms in the same industry.

In what follows I will try to bring together the separate contributions made by these different areas of economic theory towards an explanation of international production by firms. The view of the determinants of international production by firms which emerges from this survey will then provide the framework for hypothesis formulation and empirical analysis in subsequent chapters.

2.1 Determinants of the international location of production

Several factors determine the flow of products and factors and, thereby, the location of production between countries. One set of determinants is related to national differences in endowments of factors of production, technology, and tastes. Another set of determinants relates to the costs of moving products and factors internationally. International trade theory has dealt mainly with the former, location theory with the latter. However, the international mobility of factors of production means that the distinction between trade and location theory becomes blurred: once the location of production is determined, given demand patterns, so is the volume and direction of trade. The next two sections will focus on factors affecting location, while paying only formal heed to the traditional distinction.[1]

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[1] Location theorists apparently have never appreciated the sharp distinction between the two fields, seeing them as synonymous. Isard [1956] has criticized economic theory in general and trade theory in particular for being "spaceless", compressing everything in the economy to a point. This becomes especially anomalous in trade theory, which manages to treat "a one-point world, which somehow or other is conceived as divided into n parts, representing n nations, between which trade and barriers to trade exist" (p. 26).

The theory of international trade

In a world such as that assumed by neoclassical trade theory there can be no international direct investment. The most obvious reason is to be found in the assumptions traditionally made regarding international factor immobility. The basic assumption of neoclassical trade theory is that whereas products move relatively freely between countries factors of production do not. This assumption has been the chief justification for the conventional distinction between international trade theory and the theory of domestic production and exchange. It has also provided the basis (along with a number of other "traditional" assumptions) for certain powerful theorems in trade theory, most notably the Stolper-Samuelson theorem of factor price equalization.

The Heckscher-Ohlin, or factor proportions, theory of international trade, yields predictions about trade patterns with emphasis on differences in relative factor endowments between countries. According to this theory, if countries have different relative endowments of factors of production, each country will tend to specialize in the production of those goods which use its relatively abundant factor relatively more.[1] For example, a country which has relatively more capital than its trading partners will have a comparative advantage in and export those

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[1] The theorem is based on the following assumptions: different factor intensities or ratios in the production of different commodities, two homogeneous factors of production, identical and linear homogeneous production functions between countries which do not display factor intensity reversals in the relevant range and, finally, identical demand patterns between countries. The last assumption can be relaxed without invalidating the theorem as long as taste patterns are similar enough not to reverse the predictions based on supply conditions alone. The existence of transportation costs, tariffs and other barriers to trade will also affect the degree to which the conclusions apply.

goods which require a high capital-labor ratio compared with other goods. The reason is that - under the assumptions of the model - relative capital abundance will be reflected in a relatively lower price of capital and, hence, of the goods using capital relatively intensively. Trade results in equalization of commodity prices and, indirectly, in a tendency towards equalization of factor prices between countries. Certain additional assumptions assure perfect factor price equalization.[1] Trade in goods thereby substitutes for factor movements, eliminating any incentive to the latter that exists in a no-trade situation.

It can be shown (Mundell [1957])that if the assumptions of the relative mobility of commodities and factors are reversed, but all the other conditions are maintained, factor mobility will yield results identical to those of trade. Only now factor returns are equalized directly, while product prices will tend to be equalized indirectly. Under these conditions, factor and commodity movements are perfect substitutes.[2] A once and for all relocation of factors of production will make each country self-sufficient, but world output and consumption are not altered compared to a situation of commodity trade only. The distribution of income between factors of production is similarly unaffected, although its distribution between countries will change to the extent that not only factors but also factor owners move. However, if capital is the only mobile factor and the owners of capital do not change their residence, the distribution of income between countries remains unaffected by capital movements, since the return to capital in-

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1 These are: perfect competition, incomplete specialization (both countries produce some of each product) and at least as many products as factors.

2 However, if countries are completely specialized in production, factor movements are more efficient than commodity trade. See Caves and Jones [1973].

vested abroad is then remitted to the investing country.[1]

Perfect product <u>and</u> factor mobility in trade models of the above kind make the location of production and, hence, trade flows indeterminate. Any disturbance to an existing production and trade equilibrium may give rise to factor movements, which alter the location of production. Also, the imposition of any barriers to trade in commodities, e.g., a tariff, will eliminate trade entirely.

Determinacy can be obtained by introducing differential costs associated with the movement of factors and commodities. In general terms, this means that whenever it is cheaper to move factors than to move products (taking account of all relevant costs) factors will move. Incorporating such costs into the general equilibrium analysis of international trade is no easy matter, however, and the factor proportions model loses its appealing simplicity.[2]

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[1] The above effects of capital movements on the location of production and on trade and incomes follow because capital movements in trade theory are assumed to correspond to the movement of physical capital between countries. In fact, however, international investment is a flow of financial capital, which does not need to give rise to any transfer of real resources, if government policy neutralizes the effects of a net monetary outflow. This question is discussed further in section 7.8

[2] It is worth recalling that Ohlin in his classic treatise [1933] never made such limiting assumptions about the relative mobility of goods and factors in setting down the factor proportions theory of international trade. On the contrary, he analyzed both interregional commodity and factor movements in explicit recognition of their interdependence. A major portion of his work deals with the costs of transferring factors (some of which, however, like natural resources, are perfectly immobile) relative to commodities and the implications of such transfer costs for the interregional location of production and trade. In Ohlin's words: "An investigation into the nature and variations of the many-market price system in general; the part played by interregional factor movements, directly and indirectly, cannot be disregarded. The theories of interregional trade and of interregional factor movements to a great extent overlap; only the special aspects of the latter may be ignored in this treatise." [1933, p. 182].

Trade theorists have, however, begun to grapple with the problem of fitting factor movements into the formal Heckscher-Ohlin-Samuelson model. In these models capital movements are invariably seen as occurring in response to differences in rates of return between countries, which, under the assumptions of the factor proportions theory, means that capital moves from countries where it is relatively plentiful to countries where it is relatively scarce.

However, explanations of direct investment solely in terms of differences in rates of return between countries are inconsistent with empirical evidence, which shows direct investment simultaneously flowing both in and out of the same country. A number of industrial countries are both major foreign investors as well as major recipients of foreign investment from other countries. What is more, such explanations do not differentiate between the two categories of international investment, i.e., portfolio and direct investment. The latter, which has become by far the quantitatively most important form of international investment, represents the movement of (financial) capital along with ownership control of this capital. Neoclassical trade theory in effect explains only the former part, i.e., portfolio investment. Something else is required to explain the control aspect. (For the purposes of this argument we may disregard that international direct investment and portfolio investment are monetary flows, while international investment in trade theory is a real capital flow. The distinction is essential in determining the effects of capital movements, as will be discussed in Chapter 7.)

Attempts to explain international direct investment have, in general, been based on the abandonment of some of the other restrictive assumptions traditionally made in trade theory. Perhaps the most important of these is the implicit assumption that information moves freely, e.g., that production functions are everywhere the same. That information is not a free good is indicated by, among other things, the extensive sale of licenses and use of patented technology. Technological know-how has become an important tradable commodity as well as an important source of quasi-rents.

Countries may differ in technology, and these differences may, in turn, reflect differences in relative endowment of a third factor of production, namely, skilled manpower or human capital.[1] Capital mobility then means that the role of physical capital as a source of comparative advantage in exporting is neutralized and the role of less mobile factors of production, e.g., human capital, is brought to the fore.

In a sense, we are back in a two-factor Heckscher-Ohlin world where comparative advantage and, hence, the location of production is determined

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[1] Jones [1970] has investigated a trade model with perfect product and capital mobility but differing (immobile) technologies. The model fuses the Ricardian and Heckscher-Ohlin explanations of trade, since the former explained comparative advantage solely in terms of national differences in technology while the latter did so in terms of national differences in factor endowments, holding technology constant. The results of this fusion are Ricardian, however, in that technical differences tend to dominate the determination of comparative advantage.

Perfect capital mobility means that the simple factor proportions model no longer applies, since the country that is relatively well endowed with capital may not export its capital intensive good but may export its capital instead. The choice will, under the assumptions of the model, depend on the technological differences between the countries. For example, if country A is relatively well endowed with capital but B possesses superior technology in the relatively capital intensive as well as the relatively labor intensive product, capital will flow from A to B to exploit the more efficient technology. Through the movement of capital from A to B, the original relative factor endowments will be reversed, and country B will end up exporting the capital intensive product.

by countries' relative endowment of the two immobile factors: unskilled labor and skilled labor or human capital. (Corden [1974].) However, when some human capital services, as opposed to the individuals rendering them, are relatively mobile and "complementary" to financial capital, they are in the same category as mobile physical capital and have no effect on comparative advantage.

At this point, the question of the origin and dissemination of technological superiority must be raised. One possibility is that the rate of technical progress is related to a country's wealth so that wealthy countries invest more in both physical capital and in the improvement of technology. The state of technology may also depend on the volume of output, if, for example, resources devoted to research and development (R&D) increase with the level of production. Learning-by-doing also links improved technology to the level of output or, more accurately, to the integral of past output. The larger the volume of current output, or accumulated past output, the more experience and knowledge has been gained through learning. (Jones [1970].)

When the inducement mechanism for technical change is linked to the level of output, as with the latter two above, there is an implied difference between countries in the rate of technical change in different industries. This, in turn, has direct implications for comparative advantage and foreign investment. First, technical progress due to a learning effect serves to reinforce the comparative advantage of countries over time, since relatively more knowledge (technical and other) is created in industries in which a country specializes and produces for exports than in other industries. Second, to the extent that foreign investment occurs in order to exploit a superior technology developed in the home country, it is likely to occur in industries in which the investing country has (or has had) a comparative advantage. And, third, since that technology is likely to be adapted to home country factor prices, foreign investment is apt to occur in countries with factor prices similar to those in the home country.[1] That is, if foreign investment and the international transmission of technical know-how are "complementary", investment capital will not flow between countries with dissimilar costs of capital but rather the opposite.

The above hypotheses regarding the origin and dissemination of technical change thus yield predictions both about the industry and country distribution of foreign investment. They also explain the two-way flow of direct investment between the industrial countries in terms of industry differences in technological advantage between countries. The burden of subsequent sections, however, will be to show that there is a "jointness" between ownership and technology and that direct investment, therefore,

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[1] An interesting aspect of technical improvement due to learning-by-doing discussed by Jones (ibid) is that it is likely to occur in the region of techniques and factor proportions where production is taking place. Technical progress is "localized" in that the unit isoquant does not shift down uniformly but gets lowered only in the region of actual production. Jones notes that this characteristic of the learning effect has implications for the international transmission of technology. Thus, even if technical knowledge were available to all and production functions were everywhere the same, technical progress may not be transmitted between countries. The reason is that factor prices differ between countries and that production consequently takes place at different points on the common isoquant. Improvement around one point on the isoquant, e.g., where relatively capital intensive techniques are used, does not affect productive efficiency at other points selected at a different set of relative factor prices.

Jones concludes that "production functions may in some sense be the same between countries, but factor prices are different, and in their research effort countries are really 'chipping away' at different points on a common production surface." (Ibid, p. 90.)

represents not only a transfer of capital but, perhaps more importantly, a way in which know-how is transmitted internationally.

In sum, pure trade theory demonstrates that factor movements and commodity trade are substitutes. It also shows that the international location of production depends on countries' relative endowment of relatively immobile factors of production. Their endowment of internationally mobile factors, e.g., investment capital and human capital related services, has no effect on comparative advantage or on the location of production. Such factors will flow from countries where they are relatively plentiful to countries where they are relatively scarce to take advantage of lower prices of relatively immobile factors.

These results may be transposed directly to the locational choice of multinational firms. Thus, capital, and different forms of "know-how", which may be assumed internationally mobile within the multinational firm, do not affect location. Instead location is determined by the relative availability (price) of immobile factors of production in different countries.

These are important results. In the next section we shall see how location theory can add empirical content to the concepts of mobility and immobility and, in addition, how country differences in demand can affect location.

Location theory and the theory of the product cycle

Location theory emphasizes the importance of transportation costs in determining the location of production and this emphasis yields a number of predictions about trade patterns. For instance, the higher the cost of transporting a commodity (determined by its weight and bulkiness, distance, mode of transportation, etc.) relative to its value, the less likely it is to move in international trade or the closer production will be to the market.

The cost of moving factors of production - to the extent that they are physically mobile - cannot be derived in a comparable manner. Natural resources are, of course, immobile. Capital embodied in plants and equipment is in the same category as other manufactured commodities, except that the cost of transfer is prohibitive for a substantial part of it, e.g., capital invested in plants and transportation networks. Since such capital is very long lived as well as immobile,it may affect location in much the same way as does the existence of natural resources. Labor and capital for new investment, on the other hand, are mobile,but the cost of mobility does not primarily consist of transportation costs, nor is it necessarily mainly a function of distance. For labor a more important consideration is likely to be the unwillingness of people to move to new places and circumstances. Similarly, the cost of transferring financial capital must include the greater risk felt by investors in investing in an unfamiliar setting. In addition, there are costs imposed by government policy such as restrictions on immigration and international capital movements, which are comparable to tariffs or quotas applied to commodities. In general, there is a presumption that capital is highly mobile and labor less so.

The locational implications of information costs have also received attention in the literature. This has been tied to a theory of international trade, which lays stress on differences in demand between countries. (Burenstam Linder [1961].) Like transportation costs the costs of obtaining information vary with distance and type of product. It is more difficult for a producer to obtain information about, e.g., marketing possibilities in a more distant market, and it is more difficult to gather information about a differentiated product than about a relatively standardized product.

The proposition that ease of communication affects location constitutes the starting point for the theory of the product cycle as originally propounded by Vernon [1966] and Hirsch [1967]. According to this theory the location of production will be close to the market in the early stages of the production of a new product. The reason is that at this stage the effective communication between producers and buyers of the product, suppliers of inputs and potential or actual competitors is particularly important. When a product is first introduced on the market there is usually much uncertainty regarding the ultimate specification of the product and the feedback from buyers to producers is valuable. There is also uncertainty regarding the best way of producing the product, which implies frequent revision of inputs and requires communication between the producer and suppliers of inputs.

The second stage in the product cycle occurs when the product is fairly well standardized and has an established market. Communication between the producer and the market ceases to be the most important factor in the cost calculus and production costs become relatively more important. Location of production will now be determined by production costs at alternative locations. If the initial market was in a relatively high cost country, production may now be moved abroad (if the cost advantages outweigh transportation costs, potential scale economies to be realized at home, etc).

Vernon argues that the United States will have a comparative advantage in the production of new products, i.e., products in the first stage in the cycle. This is basically unrelated to any particular factor endowment - the basis of the Heckscher-Ohlin theory - but derives from the fact that the U.S. has the highest income per capita and the highest unit labor cost of all countries. Producers in the U.S. will have an incentive to satisfy wants associated with high income levels. They will be in a better position to do so than foreign producers because of their greater ease of communication through the local market. Furthermore, they will have an incentive to develop and produce labor saving producer goods and techniques due to the high cost of labor. As other nations reach higher income levels, they will begin to import these products from the U.S., and eventually, as the product achieves maturity and standardization, these other nations will begin to produce and export them to the U.S. The third stage in the product cycle refers to the stage when these products can be produced by the less developed countries and exported to the advanced countries.

If products are differentiated and if other high income countries also account for some innovation and product development, the theory of the product cycle could explain production and trade in these countries, too, as well as the fact that investment in particular products often is two-way. New and differentiated products will initially be produced in their country of origin, because of information costs, as stressed by Vernon and Burenstam Linder. They will be traded between countries of similar income levels until scale economies are exhausted and/or comparative costs of production and trade barriers favor foreign production. This provides the theoretical underpinning to Burenstam Linder's observation that countries trade relatively more with those countries having similar per capita income. Coupled with the existence of trade barriers (transportation costs, tariffs, etc.) it also explains why such a large portion of foreign manufacturing investment occurs between countries of similar income levels.

Even though the theory of the product cycle emphasizes the effect of demand factors on the location of production and trade flows, it need not be inconsistent with the factor proportions theory of trade. This is readily apparent once we realize that high per capita incomes will be associated with high savings ratios and relatively high levels of human and physical capital. Goods and services characterized by high income elasticities of demand will then be produced in countries with high per capita incomes both because this is where the market is and because these countries are relatively better endowed with the human capital required for their development.

As a complement to the factor proportions theory of trade the theory of the product cycle is very persuasive. Nevertheless, it does not by itself explain direct investment. That is, it does not explain why production abroad, once this is judged more profitable, should be undertaken by foreign instead of by local producers.

2.2 Determinants of ownership control

International trade and location theory both fail to explain one crucial feature of international direct investment and that is ownership control. The alternative to direct investment in the theories surveyed so far is capital export (without control) and the sale of technological know-how through license (where the license price should be determined by the discounted difference in profitability of using the new technology and the best available technology). Consequently, what must be explained by any theory of direct investment is why investment abroad is associated with ownership control, not only why the production process is located abroad.

The fact that in most countries firm ownership is overwhelmingly in the hands of nationals of the respective country can - when there is not outright legal discrimination - be explained by the existence of information barriers. Domestic producers may be expected to have an information advantage over foreign producers through their familiarity with the local market, with the language, with cultural, legal and institutional peculiarities of their own country. Such information is available to domestic producers free, a by-product of being a resident, as it were, while foreign producers contemplating production in the country would have to expend resources in aquiring it. This establishes the case against direct investment.[1]

The economics of imperfect competition

Direct investment nevertheless occurs and it occurs because foreign producers sometimes can earn more by producing locally than domestic producers could. The reasons for this have mainly been sought in the economics of imperfect competition. Thus, it has been suggested that foreign investors possess a monopolistic advantage over domestic producers enabling them to overcome the disadvantage of operating in another country. The names ini-

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1 Note that the information disadvantage of foreign producers is only a deterrent in making the initial decision to establish a foreign subsidiary. Once information regarding the foreign market has been gathered and once the subsidiary is operating abroad, there are, on these grounds, no difference between foreign and domestic producers. Hence, foreign producers need only incur a once and for all cost to overcome their initial information disadvantage and this, in turn, only requires an offsetting initial advantage on their part. In addressing this question few writers have distinguished between sources of competitive advantage to foreign investors which are only initial, on the one hand, and, on the other, those which are permanent in the sense of allowing a permanently higher rate of growth. Hufbauer [1973], however, does.

tially associated with this theory are Hymer [1960] and Kindleberger [1969].

Few markets come close to the textbook criterion of perfect competition. There are departures from perfect competition in goods markets, including product differentiation, special marketing skills, etc. There are also departures from competition in input markets, such as differential access to capital and managerial skill. Patented technology, which is not an input since it affects the form of the production function, also implies imperfect competition.

But how do such imperfections lead the firm to exploit its special assets itself? Hymer and Kindleberger suggest that licensing, e.g., technology to a foreign company might fail to capture the entire rent from the patented technology. One reason they give is that integration (cooperation) can increase joint profits in oligopolistic markets. But this assumes the existence of monopoly or oligopoly. The other reasons have to do with the pricing of technology and with the fact that it may be more difficult to prevent further diffusion of the patented technology once it is shared with other companies. To contribute an example of the former: it may be impossible for the licensor to satisfactorily meter the output of a licensed product or the use of a licensed technique, making it difficult to agree on a price.

Although patented technology implies imperfect competition, the reasons given by Hymer and Kindleberger for the choice of foreign production instead of licensing do not necessarily reflect imperfect competition (in the sense of non-atomistic markets). Rather, they suggest the importance of information and transaction costs, in particular, the cost of making and enforcing contracts.

Caves in an influential article [1971] accepts the premise that foreign investors must possess some competitive edge over local producers, which allows them to overcome their inherent information disadvantage in producing abroad, and suggests that this derives from superior know-how. But this is not sufficient. Exploitation of this know-how must be "complementary" to foreign production by the firm or the know-how would be sold to outsiders through licensing, consulting, etc. He concludes that knowledge related to product differentiation[1] creates this complementarity. Knowledge about how to differentiate a product and how to serve the market for that product is specific to the firm in that it cannot easily be separated from the production process or sales activity of the firm.

The central role occupied by know-how in explanations of direct investment needs to be explained at this point. Its genesis is the observation that, whatever confers an advantage on foreign investors in producing abroad, it must be easily transferable within the firm and across national boundaries but less easily transferable between different firms, whether in the same country or in different countries. A resource such as knowledge has these properties. It is potentially highly mobile geographically through an increasingly effective communication network (telephone, telex, air travel) and is often more costly to transfer between firms than within the firm, as the above examples on licensing indicate and as will be discussed further in the next section. Note, however, that certain other firm specific attributes, e.g., advantages conferred by firm size, also meet the requirement that the advantage must be specific to the firm and capable of being exploited in different countries.

[1] In Caves' words: "Differentiation is inherent in many products because of the number of minor options available in their physical design and fabrication, or because they are subject to taste diversity inherent in 'style'; ... In the nature of differentiation, a successful (rent-Yielding) product variety is protected from exact imitation by trade marks, high costs of physical imitation, or both." (Ibid, p. 5.)

Another property of knowledge that has been stressed in this context is that it has the characteristics of a public good to the firm, i.e., once it has been produced the marginal cost in further use is zero. (Johnson [1968, 1970].) Then, foreign subsidiaries of the company could draw on this knowledge - e.g., R&D results - without additional cost to the parent company. But this is only true if there are no other potential users of this knowledge, since otherwise the cost to the parent company is the income foregone in not selling it to other firms. Then, the profit-maximizing firm will choose not to transfer the asset to outsiders only if the firm can earn a higher rate of return than others could - the latter representing the opportunity cost of the knowledge to the firm.

By combining elements of industrial organization theory with trade theory the above contributions succeed in explaining why international investment is associated with ownership control. They point to the importance of a unique asset - such as superior know-how - possessed by the firm, which is capable of being exploited through foreign production but which is costly to transfer or has less value to other firms.

Although such knowledge should be related to the activities of the firm which possesses it - and in that sense be "complementary" to the firm's production and sales abroad - it is not at all clear why, as Caves holds, it must be tied to product differentiation. One interpretation is that knowledge gained by the firm in or for the production and sale of a differentiated product cannot be transferred to a firm producing a slightly different product. It is not obvious why not.[1]

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[1] Does it mean that Volvo, for example, would not be able to sell safety features it has developed to other auto manufacturers, or that the latter would not be willing to copy certain design features of Volvo, or aspects of its advertising style? Or does it merely mean that brand name products must be manufactured and sold by the firm that created the brand name? Neither appears true.

Furthermore, the link between a firm-specific (knowledge) advantage and an oligopolistic market structure, stressed by all the authors cited above, is not convincing. Caves (ibid) admits that product differentiation need not imply oligopoly. However, the fixed cost in collecting information about foreign markets prior to setting up production and sales facilities abroad gives larger companies an advantage over smaller ones in making such investment; economies of scale in producing and selling differentiated products mean that firms choose domestic growth before going abroad. The latter implies that foreign investors should at least be big relative to the domestic market. But the central feature of oligopoly, namely, interdependent decision making by a few dominant firms, is never mentioned and, like size, does not seem essential to the argument.

The oligopoly theory of direct investment focuses on some salient features of the large multinational companies, but it fails as an explanation of the numerous smaller companies that have established production facilities abroad.[1] To maintain that they, too, operate in an oligopolistic environment is to make the theory devoid of empirical significance. For example, how big must a company be in order for the fixed information cost in setting up foreign manufacturing not to be a deterrent? A big diversified company may not have a significant share of the market for any one of its products, whereas a relatively small company may have a considerable share of the market for its one product. But most importantly, the theory fails to take account of the previous history of the large foreign investors and to explain how they achieved their present size.

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[1] Se Chapter 6 for information on the size distribution of Swedish foreign investors.

The theory of the firm and direct investment

The step from oligopoly theory to the theory of the size and growth of firms is not a long one. The first thing to note is that the characteristics claimed to give foreign investors a competitive edge over domestic producers are by no means unique to multinational companies. They explain the growth of firms within an industry and across industries as well as across national boundaries. A firm displaying a higher growth rate than other firms in the same industry must have a competitive advantage over these firms. With demand growth the same for all firms in the industry such a firm must either have succeeded in lowering its cost schedule or have a more elastic supply schedule. In the case of monopolistically competitive firms such a firm might have succeeded in shifting out the demand for its product. The same is true for a firm diversifying into new product lines or geographic markets, since it would have an initial information disadvantage relative to established producers. A higher growth rate or diversification by a firm has not, of course, been thought to constitute prima facie evidence for the existence of an oligopolistic market structure.

Coase [1937] in his classic article on the firm suggested that the raison d'être as well as the equilibrium size of firms was determined by the cost of transacting contracts within the firm compared with having to carry out the same transaction in the market place.[1] Without transactions and in-

[1] It is a tribute to Coase that many recent writers have chosen his explanation of the existence of firms as a starting point for analysis. McManus [1972], Buckley and Casson [1976] and Lundgren [1975] take Coase's explanation as a starting point for analysis. Lipsey and Weiss [1973] and Dunning [1977] make passing reference to this kind of explanation. It was not aware of these writings in originally choosing to walk down a similar path. The view offered here also differs from that of the above authors in suggesting that oligopoly is not central to an explanation of the international growth of national firms, that it is, at most, a special case.

formulation costs there would be no firms. Owners of productive resources, labor and capitalists, would have no reason to submit to the central planning and direction of the firm but would sell their services in the market. The existence of such costs means that whenever transactions can be carried out at lower cost within the firm than through the market, they will be organized within the firm. These costs limit the size of firms at any one time.

This is a difficult proposition either to disagree with or to refute, as noted by Alchian and Demsetz [1972]. They suggest that firms exist more specifically because output can be increased by the use of team production and because of the peculiar problems that arise as a result of team production. These have to do with the difficulty of determining the marginal productivity and, hence, the reward to individual team members when production is joint. The firm offers a superior way of achieving this.[1]

Firms exist, then, because production can be organized more efficiently within firms than through the market. In a way, firms are a kind of specialized market. In Alchian-Demsetz' theory firms are seen as a specialized

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[1] If leisure or other non-pecuniary rewards enter the utility function, team members have an incentive to shirk from the joint work effort, because the cost to other team members of detecting such "shirking" means that no one member would have to bear the full cost of shirking. Yet, each team member would be better off if there were no shirking.

Alchian and Demsetz argue that the most efficient solution is for team members to delegate the monitoring function to a specialist, the monitor or "entrepreneur". In addition to metering marginal productivities and apportioning rewards, he will also be assigned the job of combining inputs and instructing them in what to do and how to do it. In order to provide the monitor an incentive to perform his function efficiently (i.e., not "shirk"), he is given claim to the net earnings of the team, net, that is of payments to team members and other inputs.

market institution for collecting, collating and selling information regarding heterogeneous labor inputs.

Through the productive activities of firms knowledge is created which is, at least, in part specific to particular firms. Such firm-specific knowledge helps explain the growth of firms both domestically and across national borders. The concept of firm-specific knowledge, therefore, is an important one. What is it and how does it arise? It is know-how, experience and skill relating to the activities of a particular firm gained by individuals through working in that firm.

To the extent that firms differ in organization, the products or product mixes they produce, the production techniques they employ and the markets they serve, firm-specific know-how includes knowledge of all of these. But it also includes experience gained by managers and employees in working together as a team. A large part of it is the result of learning-by-doing on the job. The creation of knowledge can, therefore, be seen as a by-product of the firm's other productive activities - a case of joint output. (Rosen [1972].) Firm-specific knowledge, however, is not a marketable output. It is embodied in the managers and employees of the firm, making their value to the firm greater than their market value.[1] Although such firm-specific knowledge cannot be separated from the firm, the firm itself could be sold.[2]

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[1] More specifically, it is the present value to the firm of exploiting its stock of intangible assets such as "goodwill" and know-how itself compared to the value of these resources that can be realized by transferring them to other firms.

[2] Rosen distinguishes two types of firm-specific knowledge. One kind is vested in the owners of the firm, the historical antecedent of which is "entrepreneurial capacity", and the other is vested in the firm or in the firm's employees. Only the latter can be transferred through sale of the firm.

Transaction and information costs as well as firm-specific knowledge provide answers to the question posed at the outset of this chapter, namely, why foreign production is undertaken by foreign investors - multinational companies - rather than by local producers. Firm-specific knowledge, which cannot be separated from the firm, explains why firms which possess it must also exploit it themselves. When the firm's particular asset is not entirely firm-specific, information and transaction costs could explain why foreign investors sometimes choose to exploit it themselves through foreign production rather than sell it in the form of, e.g., licenses or consulting services. They sometimes do the latter. If other producers are potentially as efficient in exploiting this asset, it would be sufficient that there are some positive costs associated with transferring the asset in order for the transaction not to take place. Because the owner firm does not have to incur these costs it can earn a higher rate of return. When transfer costs are low or local producers have offsetting advantages, licensing the latter will be preferred to direct investment.

According to Penrose [1959], firm-specific knowledge explains the growth of firms. If some inputs are specialized to the firm, so that their value to the firm exceeds their individual market values, the growth of firms can be seen as occurring in response to the underutilization of one or more of the firm-specific resources.[1] The full utilization of all resources in the firm requires a large and varied output program, larger and more varied

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[1] Underutilization arises because resources, as opposed to the services they render, have to be purchased in discrete quantities. Since resources are capable of rendering varying kinds as well as varying amounts of services, underutilization does not mean that they are not fully employed, only that they are not utilized according to their comparative advantage. For example, an engineer in a small firm may only work parttime as an engineer, spending the rest of his time checking inventories or making up accounts.

than the firm can organize at any one time. Over time, however, the managerial capacity may be increased and expansion is directed towards a fuller use of the resources in the firm. Penrose sees this balancing process as a continual one, providing a constant incentive for growth. New imbalances in the utilization of resources occur as previous ones are eliminated through growth and diversification.

This view of the growth of firms is applicable not only to the domestic growth of firms but also to their expansion in other countries. Direct investment involves not only the international movement of capital but perhaps more importantly the transfer of intangible inputs such as managerial skill, production or sales know-how. In fact, increased production and sales abroad by the multinational company can occur without an international capital movement or even growth in the subsidiary's equity when the expansion is financed through foreign debt, but it always requires the utilization of at least managerial capacity and often other resources from the parent company as well. Some of these resources have the character of a public good to the firm, as noted above, in that the marginal cost of further use is zero. Growth through foreign production consequently permits fuller utilization of those resources in the firm that are internationally mobile, primarily the services of some of its human capital.

But why, and at what point, do firms choose to grow through foreign production? The firm's choice between domestic and foreign production depends, as discussed in previous sections, on the cost of relatively immobile factors of production in different countries, on the firm's ability to exploit scale economies in different locations and on barriers to trade in products. However, it seems likely that domestic growth precedes growth in foreign countries and that a common sequence of events for growing firms might be the following. Initially the firm grows by expanding its sales of a single product or bundle of products in the domestic market, because it incurs lower information and trading costs in that market. As the firm continues to grow relative to its home market the profitability of further expansion in that market will fall relative to the profitability of entering new markets. The new markets the firm will consider entering at some point are either other product markets in the home country or foreign markets for its original product or product bundle. Eventually growth may involve a combination of these. Locational factors will then determine whether foreign markets are served via exports or via foreign production.

The above sequence is consistent with most manufacturing investment abroad in that the foreign output is usually sold abroad. But, of course, locational factors could argue for foreign production even when the output is to be sold in the home market. This is true, for example, of import competing industries which establish production abroad to take advantage of lower wages of unskilled labor.

The explanation of direct investment put forward here is more general than one based on market imperfections and product differentiation. Firm-specific knowledge through learning-by-doing and transaction and information costs are more pervasive in the economic system than oligopoly, they characterize all firms and all transactions to a greater or lesser extent. Therefore, without disputing the prevalence of oligopolists in the ranks of foreign investors, it is submitted that oligopoly, though it may be a sufficient condition, is not a necessary condition for direct investment to occur. Similarly, the intangible asset which confers a special advantage on foreign investors may well be successful product differentiation or other monopolistic advantages, but the use of brand names can be leased, patents can be licensed, advertising campaigns can be shared by licensor and licensees, etc., and would be if and when the asset can be profitably transferred.

Furthermore, the theory of the firm outlined here yields different positive and normative implications with respect to direct investment from those implied by the oligopoly theory. While the latter implies that direct investment would cease or diminish if market imperfections could somehow be eliminated or reduced - a generally desirable objective on welfare theoretic grounds - the present theory implies that it would not. Also, the latter implies certain welfare costs due to oligopoly - even though these may be outweighed by the benefits[1] - which our theory does not. Rather, to the extent that multinational firms - like national firms - seek to efficiently utilize firm-specific knowledge and minimize transaction and information costs, they contribute to a more efficient allocation of resources.[2]

2.3 Summary and conclusions

In turning to international trade and location theory and theories of the firm and of imperfect competition for answers to why firms produce abroad we have found that they together provide a useful framework within which

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[1] The cost of temporary monopolies granted through patent right is usually considered compensated for by the increased incentive to divert resources to innovation. Kindleberger [ibid] notes that even if direct investment belongs to the area of monopolistic competition, its effect is often to increase competition by putting pressure on domestic producers protected by tariff walls.

[2] Whether these allocation gains outweigh the alleged costs of multinational operations per se - such as a potential for tax evasion through intracompany pricing, greater maneuverability in currency crises or national labor market disputes - remains an open question, however.

to analyze the determinants of international direct investment and the growth of multinational companies. The foregoing survey started with the refined and formally developed general equilibrium theory of international trade and ended with a number of propositions from partial analysis. The loss of generality and elegance is, I hope, made up for by increased realism and insight, since to forge a link between these theories is a major undertaking. By way of summary I will, however, sketch loosely how they may be related and state some of the empirical implications that can be drawn from them.

In trade theory comparative advantage is tied to the comparative cost advantage of countries, which, in turn, depends of national differences in factor endowments (the Heckscher-Ohlin theory), national taste patterns (as stressed by Burenstam Linder and expressed in the theory of the product cycle) and technological differences between countries (a thesis which goes back to Ricardo). The comparative advantage of countries becomes an absolute advantage to firms operating in these countries. It does not, however, explain the competitive advantage of multinational firms, whose activities involve both exports from and production in several countries by one company.

The notion of foreign investors having some competitive advantage over other producers has been deduced, it will be recalled, from the presumption that domestic producers would always have a comparative information advantage vis-à-vis the former. Consequently, in setting up production abroad investors must possess an offsetting advantage, which enables them to compete with domestic producers in the foreign country. However, such an advantage is a necessary characteristic not only of foreign investors but also of firms diversifying into other product markets or displaying a higher rate of growth than other firms in the same industry.

The competitive advantage of multinational companies must derive from some factor which is firm-specific rather than country-specific, where country-specific factors are those which are available to all firms producing in a particular country and firm-specific factors are available only to particular firms. Specificity, of course, is not an absolute concept, but refers to the relative cost of transfer. Natural resources are specific to a country and know-how relating solely to the operations of a particular firm are specific to that firm in the absolute sense.

Sources of such a firm-specific competitive advantage, it has been suggested, are different forms of know-how. It may be know-how incorporated in formal R&D results or it may be experience and skill in management, sales and production gained by the firm through learning-by-doing. The former is the one that has been stressed almost exclusively in the literature. Firm-specific advantages can also derive from firm size, if big companies are able to borrow in the capital market at lower cost or can operate at lower cost because of risk spreading, or if there are increasing returns to firm size in R&D, advertising, administration, etc. Size, then, is only a proxy for these other advantages and size itself remains to be explained.

Country-and firm-specific factors are not independent, however. They become linked by the way in which productive knowledge is created and by the way it becomes disseminated. The comparative advantage of countries, then, is relevant not only to the determination of the locational choice made by firms serving many national markets but also to the competitive advantage of multinational companies of different national origin. I will suggest how below.

Firms in different countries will specialize in accordance with the comparative advantage of each country. In the absence of any factor mobility this means that firms in the wealthy industrial countries, for example, will tend to have a competitive advantage (barring factor intensity reversal, offsetting demand differences, etc.) in the production of goods which require relatively large inputs of physical and human capital and in goods which are sold primarily in high income markets. In addition, they will tend to have a competitive advantage in producing goods which require relatively large inputs of those natural resources with which each country is relatively well endowed.

Factor mobility alters these conclusions insofar that countries may choose to export factors of production instead of products. Wealthy countries will then be potential exporters of financial and human capital, i.e., they will become foreign investors. Foreign investment will take the form of direct investment, i.e., the setting up of foreign subsidiaries by national firms, when the human capital services (know-how, experience, skill) are more profitably transferred across national borders within the firm than between firms.

The choice between exports and foreign production depends on comparative production costs at alternative locations and on trading costs in serving foreign markets through exports. When some factors of production are internationally mobile, comparative cost differences between countries depend crucially on the availability (and price) of relatively immobile factors. Hence, capital may be expected to flow from, e.g., the industrial countries to the developing countries to exploit natural resources or to take advantage of relatively low wages of unskilled labor. It may also be expected to flow to countries with large markets but where barriers to trade in commodities are relatively high. In the former case the foreign output is more likely for sale outside the country of production, while in the latter it is likely to be primarily for sale within the region for which transport and tariff costs are reduced.[1]

A change in comparative production costs between countries or a change in barriers to trade or to factor mobility will tip the competitive balance and shift some production between countries. This may also be brought about through changes in the ranking of goods with respect to factor intensities. One way in which this may occur is that products move through stages of changing factor requirements, as described by the theory of the product cycle. Another way is that the introduction of new products and processes changes the product bundle produced in a country. For example, as a result of the introduction of new products, products that were previously among the most capital intensive may become relatively less so and the country in which production originated loses its comparative advantage. Thus, although the production function or the product itself does not change in this case, products move through stages of changing relative factor intensities. Rising per capita income over time means that products and processes in the less capital intensive end will be discontinued in each country.

The induced changes in production patterns may be achieved through a reallocation of resources either within countries or between countries. The presumption that factors are less mobile internationally than nationally has meant that the former has typically been thought to be the case. But when resources are firm-specific rather than country-specific, they are more mobile within a firm across national borders than between firms in the

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[1] The competitive advantage of multinational firms in undertaking "backward vertical" investment, i.e., in the exploitation of raw materials, may be different from that present with "horizontal" investment, i.e., producing similar output at home and abroad. The distinction becomes important in an empirical context. For a discussion see Caves [1971].

same country. Thus, in the course of producing for the home market and for exports firms have acquired knowledge relating to the production and sale of its products which can be utilized even if production is moved abroad.

When the comparative advantage of countries differs the distribution of firm-specific knowledge across industries in different countries also will differ. Therefore, there is no reason why the industry distribution of foreign investment undertaken by firms of different nationality should be the same. However, to the extent that one can show that firm-specific knowledge regarding technology, product differentiation, etc., is relatively more important in some industries than in others, one would expect - holding other influences constant - these industries to be characterized by relatively high levels of direct investment in all countries. Countries which have a comparative advantage in these industries should also tend to be the more sizeable foreign investors.

A number of empirical implications flow from the theories outlined here. They relate both to the level and pattern of foreign investments by different countries and to the level and pattern of foreign investment by individual firms. In most of what follows the analysis will be couched in terms of the behaviour of individual firms. This focus is consistent with the above emphasis on the theory of direct investment ultimately being a theory of the firm. Only in the next chapter will the question of national differences in the pattern of foreign investment be touched on.

Chapter 3

Swedish, U.S., and U.K. Foreign Investment: Some Comparisons*

In this chapter the volume and broad pattern of Swedish direct investment abroad will be described and compared with the foreign direct investment of two of the major investing countries, the U.S. and the U.K., the only countries for which comparable data were available. One purpose of these comparisons is to describe Swedish direct investment while at the same time placing it in an international setting. Another is to look for similarities or differences in the foreign investment activities of different countries which will give us some insight into the determinants of international investment.[1]

What would one expect the findings from such comparisons to be? In particular, should one expect different investing countries to show similar distributions by industry and host country of direct investment?

The theories of direct investment surveyed in the foregoing chapter do not yield explicit hypotheses regarding the pattern of outward direct investment by different countries. Explanations of direct investment

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* This chapter builds in its essentials on Swedenborg [1975].

1 All data on Swedish direct investment abroad come from the IUI data base unless otherwise stated.

stressing the presence of oligopoly conditions, product differentiation, or product-cycle characteristics suggest hypotheses regarding the industry distribution of direct investment. In that these characteristics and the characteristics of the investing country have not been linked,[1] there is a presumption in much of the literature that the outward investment by different countries is explainable by these industry characteristics alone. Then, given that locational factors argue for foreign production, industries characterized by oligopoly conditions, product differentiation, etc., should tend to be large foreign investors in all countries. This follows because industry characteristics are relatively similar across countries, i.e., the ranking of industries with respect to R&D intensity, capital intensity, the importance of scale economies, etc., is fairly similar.

Hirsch [1976], a proponent of the product cycle theory, makes the point explicitly. He argues that firm-specific know-how is particularly important in "high technology industries which manufacture new product cycle goods", such as chemicals, pharmaceuticals, instruments, computers, and in industries "characterized as mature oligopolies", e.g., automobiles, tobacco, cosmetics and tyres. Hence, he expects "the multinational sector of all countries to be dominated by industries where K-intensive firms abound", i.e., firms utilizing relatively large amounts of firm-specific know-how. (Italics added.) Hirsch claims, but does not show, that survey evidence pertaining to the U.S., Sweden, the U.K., Germany, France, and Japan tends to confirm that such industries dominate the outward investment of these countries. (Ibid, pp 267-268.)

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[1] Or this link has been so general that it would be applicable to most industrial countries which have foreign investment. This is true of statements such as, "The U.S., because of its high per capita income ..." or "The U.S. is relatively well endowed with human and physical capital, therefore ... ."

Is this so? And does it follow from the theory of a firm-specific advantage and foreign investment? In the previous chapter, we concluded that the theory does not imply a similar industry pattern of investment by different countries. Firm-specific knowledge, we argued, is generated to a relatively larger extent in industries in which each country has a comparative advantage. (The reason, it will be recalled, is that we believe a large part of it is due to learning-by-doing.) Hence, the industry distribution of firm-specific knowledge will not be the same across countries and the industry composition of direct investment will therefore also tend to differ.

Other investing country characteristics that are relevant in determining both the industry and country distribution of the outward investment of different countries, and that presumably are impounded in the phrase "given locational factors" above, are the size of the home market, resource endowment, distance to major markets, to mention a few.

3.1 Different kinds of international direct investment

Following Caves [1971], one may distinguish between international investment which represents (i) vertical expansion backward or forward by the firm, i.e., adding earlier or later stages in the production process (ii) horizontal expansion, i.e., producing the same goods elsewhere, and (iii) conglomerate diversification. Most foreign investment involves vertical or horizontal expansion. Conglomerate diversification through international investment is rare. According to these definitions, investment in agriculture, mining and petroleum, is often backward vertical investment, investment in foreign sales subsidiaries represents forward vertical integration and investment in manufacturing is, for the most part, horizontal investment as is investment in transportation, construction, banking, etc.

Manufacturing investment abroad is the most important kind of international direct investment by value. Its relative importance varies a great deal between different investing countries, however. It makes up some 70 percent of the stock of Swedish direct investment but only some 40 per cent of U.S. direct investment abroad. The difference is largely due to the extensive investment by U.S. firms in mining, petroleum, and agriculture and the total absence of Swedish direct investment in these sectors, excepting a negligible amount in mining. As seen in Table 3:1 the distribution of U.S. and U.K. direct investment by main industry is relatively more similar.

The motives for vertical investment, especially backward vertical investment, may differ from the motives for horizontal investment. Caves [ibid] argues that backward vertical integration must entail benefits from the physical integration of processes. In the absence of technological complementarities, the alternative to vertical investment is long-term contracts between buyers and sellers of raw materials. According to Caves, the explanation for backward vertical investment turns on "the avoidance of oligopolistic uncertainty and the erection of barriers to entry of new rivals - as in the case of domestic markets". (Ibid, p. 10.)

The fact that the U.K. invests relatively more in raw materials extraction abroad than the U.S. does can be explained by differences in resource endowment between the two countries. Vertical integration into raw materials production, whatever its causes, can, to a larger extent, take place within the U.S. because the U.S. domestic resource base is larger. (Krainer [1967]).

Table 3:1 The stock of U.S., U.K., and Swedish direct investment by main industry
(Millions of dollars and per cent)

	United States 1970		United Kingdom 1968		Sweden 1970[a]	
	million	%	million	%	million	%
Mining	6 168	11	1 054	8	(30)	(1)
Manufacturing	32 261	57	7 067	53	1 412	74
Other industries, excl. petroleum[b]	18 035	32	5 284	39	(470)	(25)
of which						
Trade			2 290	17	(300)	(16)
Agriculture			1 094	8	(0)	(0)
Total, excl. petroleum	56 464	100	13 405	100	1 912	100
Total, incl. petroleum	78 178				1 912	

Direct investment includes investment in subsidiaries as well as in minority owned firms in which the ownership interest is 10 % or more. It is defined as the book value of the investing firm's share of equity capital in, and short- and long-term claims on the foreign firm.

[a] The figures in parentheses are estimates. Direct investment in sectors other than mining and manufacturing has been estimated on the basis of a census made in 1966 (Lund [1967]). The values correspond fairly well with the distribution by sector of the net capital outflow in the period 1965-70.

[b] Also excluding finance and insurance for the U.K.

Sources: Survey of current Business, October 1971, November 1972, Board of Trade Journal, September 23, 1970.

The difference between the U.S. and the U.K. in the relative importance of investment in raw materials cannot be discerned on the basis of the figures in Table 3:1,which excludes the large U.K. petroleum industry. A more striking difference in this respect is between the two big countries, on the one hand, and Sweden, on the other. The small size of the Swedish economy and the large scale on which most investment in raw materials extraction is undertaken help explain this. Swedish industry has traditionally had a comparative advantage in the processing of domestically available raw materials. Given the small size of the domestic market Swedish firms have no basis for competing with producers in other countries in the processing of most imported raw materials.

To the extent that Swedish firms have invested in foreign raw materials extraction, they have not done so for the purpose of importing the raw materials to Sweden. Instead they have invested abroad to exploit the kind of natural resources which are available domestically and which are exported from Sweden - such as forest products and iron ore - and in the production of which Swedish firms possess superior know-how. The motive for this investment, therefore, seems to have been the profitable exploitation of this know-how outside Sweden. Then, the limited Swedish raw materials investment is not "vertical investment" in the sense of adding earlier stages of production, but is explainable by the same factors that will explain manufacturing investment.

In the post-war period manufacturing investment has grown at a more rapid rate than any other kind of international investment. The share of manufacturing in the stock of total U.S. direct investment abroad increased from 32 per cent in 1950 to 35 per cent in 1960 and 41 per cent in 1970.[1] Their share in the U.K. total - excluding petro-

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[1] Tariff Commission [1973], p. 105.

leum for which we have no data - increased by 4 percentage points 1960-68.[1] There are probably many reasons for this trend. For example, it may be due to the liberalization of trade and capital flows in the post-war period and the consequent integration of national economies. It may, in part, reflect an adjustment of the stock of foreign manufacturing investment to levels that would have obtained in the absence of the disruptions brought on by the war.[2] The shift from raw materials extraction may reflect the altered political and economic situation especially in many of the less developed countries where such investment was once undertaken.

Despite the common growth trends there are considerable differences between the manufacturing investment of the U.S., the U.K. and Sweden both in the composition of manufacturing investment by industry and in its distribution by country. Before looking at these differences somewhat more closely it is instructive to compare the size of foreign manufacturing investment relative to the economies of the investing countries. Sweden's position as a foreign investor becomes relatively more important when attention is focused on manufacturing investment alone: Sweden's share of the total foreign investment of the three countries is perhaps a little over 2 per cent (the uncertainty regards the size of U.K. petroleum investment), while its share of manufacturing investment is 3.5 per cent.

3.2 The relative size of manufacturing investment abroad

Foreign manufacturing is far from being a minor activity for the manufacturing industry in countries like Sweden and the United States. Table

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[1] Board of Trade Journal, Jan. 26, 1968 and Sept. 23, 1970.

[2] Hufbauer [1973] suggests this as a possibility.

3:2 presents some comparative data for Sweden and the U.S. which illustrate this. The foreign investment and employment figures indicate that foreign production amounted to about one fifth of domestic production in 1970. They also reveal that it is slightly more important to Swedish manufacturing industry than it is to the U.S. manufacturing industry. For example, employment in foreign manufacturing affiliates of Swedish firms was 20 per cent of manufacturing employment in Sweden in 1970 (in 1974 it was 24 per cent), while the corresponding ratio for U.S. firms has been estimated at 18 per cent.

There is, however, a large difference between the two countries in the share of total foreign sales which is supplied through foreign production. Table 3:2 shows that some 60 per cent of U.S. foreign sales is produced abroad, while the corresponding Swedish share is only around 30 per cent. In fact, the U.S. share is likely to be even higher, since the figure in the table is based on a sample survey covering only the largest investing firms.

One explanation for the above difference between the U.S. and Sweden is the different size of the two countries, both in the economic and the geographic sense. Trade and investment across different parts of the U.S. is a domestic activity for U.S. firms, while the corresponding geographic expansion by Swedish firms is necessarily an international activity. This would explain the relatively larger international involvement of smaller countries in general.

Another factor, which explains the much higher export share of Swedish industry compared to that of U.S. industry, is the existence of scale economies in production. A relatively small domestic market has made Swedish firms dependent on exporting in order to exploit scale econ-

Table 3:2 The relative size of Swedish and U.S. manufacturing abroad

	Sweden			United States	
	1965	1970	1974	1966	1970
Property, plant and equipment expenditures:					
foreign manufacturing affiliates in % of domestic manufacturing	n.a.	22[a]	n.a.	17[b]	20[b]
Employment:					
manufacturing and sales affiliates in % of domestic manufacturing	18	24	30	16	n.a.
manufacturing affiliates in % of domestic manufacturing	16	20	24	13	(18)[c]
Net sales by manufacturing and sales affiliates in % of total foreign sales[d]	31	32	32	60[e]	62[e]
Imports from manufacturing affiliates in % of total imports of manufactures	0	1	2	13	16

[a] Only majority-owned manufacturing firms. The change in the book value of property, plant and equipment 1969-70 plus depreciation has been related to the manufacturing industry's investment in these assets according to Nationalräkenskaperna.

[b] Foreign investment includes investment in minority owned manufacturing firms abroad and consequently is somewhat overestimated in relation to the corresponding Swedish figure.

[c] The figure is an estimate of total imports from affiliates based on information from a sample survey.

[d] Net sales by foreign affiliates is defined as total sales less imports from parent firm in the investing country. Total foreign sales is defined as affiliate net sales plus total manufacturing exports.

[e] Information on foreign sales is based on a sample survey and therefore underestimates foreign sales by all firms.

n.a. = not available.

Sources: Survey of Current Business, Oct. and Dec., 1967, Sept. 1971, Jan. 1973, U:S. Direct Investment Abroad 1966, Part II, Statistical Abstract of the United States, 1971, U.S. Tariff Commission (1973); Nationalräkenskaperna, Industri, Utrikeshandel.

omies in their domestic production. U.S. firms, on the other hand, can reach that size, and beyond, in the home market. If domestic growth precedes growth in foreign markets, this difference means that U.S. firms have been less constrained by unexploited scale economies at home in choosing between exports and foreign production in serving foreign markets.

The different size of foreign trade in the economies of Sweden and the U.S., coupled with the equal relative importance of foreign manufacturing activities, also explains another difference between the two countries, namely, the proportion of total imports which comes from foreign manufacturing affiliates. Imports from Swedish manufacturing affiliates abroad were only around 1 per cent of total Swedish imports, while the corresponding share for the U.S. has been put at around 15 per cent in 1970. The difference also reflects a higher propensity to export back to the home country by U.S. foreign affiliates, however. The proportion of total affiliate sales exported to the U.S. was 11 per cent in 1970. The corresponding share for manufacturing affiliates of Swedish firms was only 2 per cent. Again, this should be related to the large size of the U.S. domestic market and the competitive advantage of U.S. firms in serving it.

3.3 The country and industry distribution of manufacturing investment

There is a presumption in much of the literature, as pointed out above, that the determinants of international production imply a similar industry pattern in the foreign investment of different countries. This follows from the twin notions that firm-specific advantages are generated to a relatively larger extent in industries with certain characteristics, e.g., high technology industries, and that there is no link between such a "knowledge advantage" and the characteristics of the investing country.

Several factors should contribute to making the regional distribution of foreign investment by different countries similar, too. For example, host country characteristics, such as market size, non-preferential tariffs, and production costs work in that direction. Distance from the investing country and preferential treatment by host countries work against it.

Expectations regarding a similar distribution by industry and region of the outward investment of different countries should be tempered by several considerations, however. For one thing, even assuming that the same industry characteristics determine the foreign investment of different countries, the industry distribution of the stock of foreign investment at a particular time need not be the same. Foreign investment by different countries can have different time profiles and the current industry pattern may reflect when the bulk of that investment was made. The technology advantage of a particular industry and the incentives for that industry to invest abroad were not necessarily the same in the 1920's as in the 1960's, for example. Yet, foreign subsidiaries established in the 1920's may nevertheless survive alongside the more expansive new investors. They no longer have any particular technology advantage vis-à-vis other producers but their foreign activities are so well established that it is not necessary. (Som of these "old" investors could perhaps be classified as "mature oligopolies" and be cited in support of Hirsch's hypothesis mentioned above. But the oligopoly label is not necessary and does not add to our understanding of the phenomenon.)

The argument does, however, imply that different countries should display a similar pattern of investment expansion in a particular period. If the competitive advantage of multinational firms is generated in certain industries, these industries should be increasing their share of each country's total investment. The same applies to the regional distribution of direct investment. If the creation of the Common Market was an incentive for U.S. firms to locate production inside the tariff walls, it should have provided a similar incentive to other non-members.

More fundamentally, one can question the whole idea that firms in different countries should have a competitive advantage vis-à-vis each other in the same sort of activities. It seems more plausible that the competitive advantage of foreign investors is related to the comparative advantage and specialization pattern of the home country's industry. Firm-specific know-how is generated to a varying extent in all activities and it will provide a basis for direct investment (or growth generally) when that know-how gives an edge over competitors at home and abroad. The relevant norm is not "knowledge intensity" relative to other industries in the investing country but the comparative "knowledge advantage" relative to the same industries in other countries. For example, the textiles industry is characterized by a low R&D intensity relative to other industries. Yet, it ranks among the largest foreign investors in Japan (see Yoshino [1976]) because Japanese firms have a competitive advantage in textiles production.

A different industry composition of foreign investment, in turn, is sufficient reason for differences in the regional distribution, since the optimal location of production depends on what is being produced and for which market.

The country distribution

The growing importance of manufacturing investment has been associated with an increased concentration of foreign investment in industrial host countries. Around 80 per cent of the manufacturing investment of the U.S., the U.K., and Sweden has been undertaken in the developed countries, while the share of raw materials investment in these countries is very much lower.

Aside from the strong concentration in the industrial countries there are, however, few similarities in the regional distribution of the foreign investment by the three countries, as seen in Table 3:3. Clearly, the different geographic patterns cannot be explained by reference to the size of host country markets, tariff structure and other factors usually assumed to determine the location of production, since these factors presumably affect potential investors in different countries in much the same way.

Political and cultural affinity appears to have played a role in determining in which country to invest. Over 60 per cent of the foreign investment of the U.K. has found its way to the English speaking world - the U.S., Canada, Australia, New Zealand and South Africa. For the U.S. the corresponding share was over 50 per cent, more than half of which was in Canada, and for Sweden it was barely 30 per cent. Geographic proximity may be an equally important factor in attracting U.S. investment to Canada. Either of these factors could explain the relatively sizeable involvement of Swedish firms in the neighboring Nordic countries.

The influence of "traditional commercial ties" means that direct investment and exports tend to be concentrated in the same countries, as seen in the second panel of the table. It does not mean, however, that the regional distribution of direct investment merely mirrors that of exports. Both U.S. and U.K. direct investment are even more concentrated in other English speaking countries than are their exports. The same is true of Swedish investment. Assuming that the distribution of direct in-

Table 3:3 The stock of U.S., U.K., and Swedish manufacturing investment and exports by area and country 1970
(per cent)

	Direct investment			Exports		
	U.S.	U.K. 1968	Sweden	U.S.	U.K.	Sweden
Developed countries	83	81	85	71	77	89
EEC	22	13	42	20	23	29
EFTA	19	2	19	11	17	47
of which						
United Kingdom	15	-	8	6	-	13
Nordic countries		1	9	3	12	29
Other Europe	1	4	2	3	8	3
United States	-	15	10	-	12	6
Canada	31	11	6	22	4	2
Australia, New Zealand, South Africa	7	36	5	4	11	2
Japan	2	0	0	11	2	1
Developing countries	17	19	15	29	23	10
Africa	0	4	1	2	6	3
Middle and Far East	2	7	2	11	11	3
Latin America	14	7	12	16	6	4
World[a]	100	100	100	100	100	100

Manufacturing investment is the book value of direct investment in foreign manufacturing. See also notes to Table 3:1.

[a] Excl. non-OECD Europe, Sino-Soviet, Oceania.

Sources: Survey of Current Business, November, 1972 and October, 1971. Board of Trade Journal, September 23, 1970, Utrikeshandel and Appendix C tables.

vestment roughly corresponds to the distribution of foreign manufacturing output, this reflects a relatively high propensity to supply these markets through local production rather than through exports from the investing countries.

In the case of Sweden and the U.K. the relatively high propensity to produce locally in North America and in the other non-European industrial countries (Australia, etc.) could be explained by distance-related factors in combination with relatively favorable conditions for local production. The same may be said of the high U.S. propensity to produce in the U.K. Unfavorable conditions for local production and the small size of local markets can perhaps account for the relatively small investments in Africa and Asia compared to exports to these countries, while in Japan the policy against foreign ownership of Japanese industry could account for the low investment in that country.

Thus, it is tempting to try to interpret the differences in the proportion of sales which is supplied through local production in terms of factors affecting location such as distance, tariffs, relative production costs,and the like. But such explanations are obviously loosely founded at this stage. For example, they do not easily explain both the relatively high U.S. propensity to produce in Canada and the relatively low Swedish propensity to produce in the Nordic countries. Both are neighboring countries with which the investing country traditionally has extensive commercial ties.

There is a suggestion in the regional pattern especially of Swedish direct investment and exports that the relationship between the two sources of supply is one of substitution. It is seen most clearly in the very large concentration of direct investment to the EEC countries compared to the EFTA countries, of which Sweden is a member, and the reverse situation with respect to exports. Further evidence will be presented in Chapter 7, where we will analyze the relationship between foreign production and exports of Swedish firms.

In sum, host country characteristics do not ensure a similar regional pattern of direct investment by different countries. Other factors are also at play. Clearly, among these other factors are distance from the investing country and what may be termed "cultural affinity" or "traditional commercial ties". Another may be differences in the industry composition of direct investment.

Differences in the time pattern of foreign investment may also account for differences in the country distribution of the current capital stock. Thus, it appears that the growth of investment in different regions in the same period has been fairly similar. For example, the creation of the EEC has apparently been an inducement for investors in all three countries to expand production inside the customs union causing investment in the EEC to expand relatively more rapidly than that in other regions in the 1960's.

The industry distribution

Swedish manufacturing investment is highly concentrated in the engineering industry. By 1970 over 70 per cent of total manufacturing investment was in the following four industries: metal manufacturing, non-electrical and electrical machinery, and transportation equipment. This is a much higher proportion than the share of these industries in manufacturing output in Sweden or in Swedish exports. Swedish foreign investment in the chemical industry used to be sizeable but has declined steadily in the post-war period.

It is impossible to discern any common pattern in the foreign investment of Sweden, the U.S., and the U.K. in Table 3:4. Metal manufacturing, non-electrical and electrical machinery and transportation equipment account for a sizeable portion of U.S. foreign investment also, some 50 per cent, but their ranking is very different from that of the Swedish industries. Non-electrical machinery accounted for only 15 per cent of U.S. foreign investment compared to 40 per cent of Swedish foreign investment in 1970. Transportation equipment made up 16 per cent of U.S. and only 5 per cent of Swedish foreign investment in the same year. Furthermore, the relative size of the chemical industry in U.S. foreign investment is twice that of this industry in Swedish foreign investment. In contrast to the Swedish case, the U.S. chemical industry has expanded rapidly in the post-war period.

The industrial composition of U.K. foreign investment complicates the picture further. Although the U.K. chemical industry weighs as heavily as that of the U.S., the four engineering industries accounted for only 27 per cent of U.K. foreign investment in 1974. Instead, the largest foreign investor in the U.K. was the food products industry, accounting for as much as 26 per cent of the total.

The only industry which is relatively minor in the foreign investment of all these countries is the textiles industry. This industry, however, accounts for a major portion of the growing foreign investment of Japan, as mentioned above. Consequently, no safe conclusion regarding inherent industry characteristics as conducive to foreign investment can be drawn on the basis of the information so far.

These comparisons are admittedly crude and invite many objections.

Table 3:4 The stock of U.S., U.K., and Swedish manufacturing investment and exports by industry
(Per cent)

Industry	Direct investment: U.S. 1970[a]	Direct investment: U.K. 1974[b]	Direct investment: Sweden 1970[b]	Exports, 1970: U.S.	Exports, 1970: U.K.	Exports, 1970: Sweden
Food, drink, tobacco	6	26	1	14	7	2
Textiles, apparel, leather and leather products	2	7	0	4	8	4
Paper and allied products, printing and publishing	6	7	11	4	2	18
Chemicals, rubber, plastic products	22	22	10	15	14	6
Primary and fabricated metals	8	5	13	10	13	19
Machinery (ex. electrical)	15	8	43	21	22	8
Electrical machinery	11	11	12	8	8	8
Transportation equipment	16	3	5	16	14	15
Other manufacturing	14	11	5	8	12	0
All industries	100	100	100	100	100	100

[a] Book value of total assets in foreign manufacturing affiliates.

[b] Book value of direct investment capital in foreign manufacturing affiliates.

Sources: U.N. Yearbook of International Trade Statistics.
Trade and Industry, 25 February 1977, U.S. Tariff Commission [1973], Utrikeshandel and Appendix C tables.

A finer industry classification in Table 3:4 would, I believe, reveal both more similarities and dissimilarities. The breakdown of some aggregates would reveal many industries which have no foreign investment, but it would also show differences in intra-industry specialization between countries.

Several empirical studies have been based on similarly aggregated data. Gruber _et al_. [1967] and Horst [1972], for example, found support for the hypothesis that the competitive advantage of U.S. firms was based on R&D intensity using similar industry data. Such results are probably aided by the fact that, e.g., aircraft is included in the transportation equipment industry, which contributes to a high R&D intensity, even though the large foreign investment emanates from the automobile industry.[1]

Gruber _et al_. found that foreign operations were concentrated in the most R&D-intensive industries but found no correlation between R&D intensity and either exports or foreign production. A similar concentration in R&D-intensive industries characterizes Swedish direct investment abroad, too. This is in large part due to the large foreign investment of the chemical industry, which has a high R&D intensity in Sweden. Disaggregation, however, reveals that the foreign investment of the industry is dominated by subindustries (matches and gas) with very low R&D intensity.

The lack of a common industry pattern in the foreign investment of the three countries suggests that foreign investment cannot be explained by common industry characteristics only. Industry characteristics clearly play a role in determining the location of production, but they are not as closely related to the ownership advantage, or firm-specific advantage, as has been thought. One reason may be that such firm-specific knowledge advantages are not distributed equally

[1] See U.S. Tariff Commission Report [1973].

by industry in all countries. Thus, it is possible that such a knowledge advantage characterizes the U.S. chemical and automobile industries vis-à-vis these industries in other countries, while a similar advantage characterizes firms in the Swedish machinery industry.

This finding, while contradicting what appears to be common notions in the literature[1], is consistent with the hypothesis formulated at the outset of this chapter. This hypothesis asserts that know-how in the form of learning-by-doing is generated in all industries, not only the technologically advanced, and is comparatively larger in a country's exporting industries. In other words, a country's comparative advantage in exporting may be a potential advantage in producing abroad. Whether foreign investment, in fact, occurs in these industries will depend on locational factors. On the other hand, when foreign investment is undertaken with a view to selling the output in the home country, the industry's competitive advantage should instead be related to sales in the home market.

There does appear to be a relationship between the size of direct investment of different countries by industry and each country's comparative advantage in exporting. For example, in those industries where U.S. exports account for a relatively larger share of world markets than do Swedish exports[2], U.S. direct investment is also relatively more sizeable than is Swedish direct investment. The same seems to hold in a comparison between the U.K. and Sweden, but not between the U.K. and the U.S.

Divergent export patterns between Sweden and the U.S. and the U.K. go some way towards explaining the divergent investment patterns of Sweden and these countries. This can be seen in Table 3:4, which shows both the

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[1] It definitely contradicts Hirsch's assertion, cited above, that the outward investment of different countries is dominated by the same industries.

[2] I.e., relative to each country's overall share of foreign markets.

industry distribution of direct investment and of exports for the three countries, and even more clearly in the correlation matrices presented in Table 3:5. They do not explain the different investment patterns of the U.S. and the U.K., however. The export patterns of the U.S. and the U.K. are rather similar - at this level of industry aggregation - but the investment patterns are not. In contrast to the U.S. and Swedish cases there is a negative correlation between the industry distribution of U.K. exports and direct investment.

The negative, though low, correlation between U.K. foreign investment and export patterns indicates that the competitive advantage of U.K. firms in producing abroad is not related to its comparative advantage in exporting from the U.K. It suggests rather the opposite, namely, that U.K. foreign investment in some industries may be related to its imports. For example, it is possible that the relatively large U.K. foreign investment in the food industry, at least originally, was related to its similarly relatively large investment in agricultural production abroad. Both may then have been motivated by the large U.K. domestic market and its relatively limited endowment of agricultural land. Furthermore, U.K. investment in the two "run-away" industries textiles, etc., and printing is relatively large. These are industries in which the U.K. presumably has lost its competitive advantage in producing but in which U.K. firms have not lost their advantage in selling domestically.

3.4 The industry pattern of inward and outward investment in Sweden

Differences in the competitive advantage of foreign investors in different countries and the factors determining the choice between exports and foreign production can also be analyzed by comparing the industry distribu-

Table 3:5 Simple correlations between the percentage distribution of direct investment and exports by the U.S., the U.K., and Sweden[a]

a) Correlation between the industry distribution of direct investment by different countries

Direct investment	Direct investment U.K.	U.S.	Sweden
U.K.	1		
U.S.	.17	1	
Sweden	-.22	.33	1

b) Correlation between the industry distribution of direct investment and of exports by different countries

Direct investment	Exports U.K.	U.S.	Sweden
U.K.	-.14		
U.S.		.65	
Sweden			.58

c) Correlation between the industry distribution of direct investment relative to other countries and of exports relative to other countries

Direct investment	Exports $\frac{\text{U.S.exp.}}{\text{Sw.exp.}}$	$\frac{\text{U.K.exp.}}{\text{Sw.exp.}}$	$\frac{\text{U.S.exp.}}{\text{U.K.exp.}}$
$\frac{\text{U.S.DI}}{\text{Sw. DI}}$	.83		
$\frac{\text{U.K.DI}}{\text{Sw. DI}}$		.78	
$\frac{\text{U.S.DI}}{\text{U.K.DI}}$			-.12

[a] The percentage distributions are those shown in Table 3:4.

tion of inward and outward manufacturing investment of the same country. This is done for Sweden in Table 3:6, where the comparisons are based on employment in Swedish manufacturing subsidiaries abroad and in foreign manufacturing subsidiaries in Sweden.

First, we may note that Sweden is a net foreign investor, especially in the manufacturing sector[1] and that employment in foreign manufacturing affiliates of Swedish firms was more than four times that of foreign-owned manufacturing firms in Sweden in 1970.

The first two columns in Table 3:6 show the percentage distribution of Swedish manufacturing employment abroad and of foreign manufacturing employment in Sweden respectively. They diverge in a way which is in part consistent with the difference between the two major investing countries and Sweden shown in Table 3:4. Thus, a relatively larger proportion of foreign manufacturing employment in Sweden is found in the food products, textiles and apparel, and chemicals industries than is true of Swedish employment abroad.

In other respects, however, the difference between inward and outward investment is smaller than between the latter and the outward investment of the U.S. and the U.K. For example, the same four industries (chemicals, metals, non-electrical and electrical machinery) account for the overwhelming part of both inward and outward investment (70 and 85 per cent respectively). When standardized for the size of these industries in Sweden, as in the second two columns, only the foreign ownership in the chemicals and electrical machinery industries remains particularly noteworthy. The food products industry may also be singled out for its growing

[1] Manufacturing employment was 60 per cent of total affiliate employment abroad in 1974. (SCB, "Internationella företag 1974" sets the total at 318 140 employees.) It was 52 per cent of total employment by foreign firms in Sweden in 1970.

Table 3:6 Employment in Swedish manufacturing affiliates abroad and in foreign manufacturing affiliates in Sweden by industry in 1970 (per cent)

Industry	Distribution of employment		In per cent of industry employment in Sweden	
	Swedish abroad	Foreign in Sweden	Swedish abroad	Foreign in Sweden
Food products	1	9	3	6
Textiles, etc	2	7	4	4
Paper, pulp	2	3	8	2
Paper products, printing etc.	2	4	7	3
Chemicals, rubber etc.	14	22	38	14
Primary and fabricated metal	10	13	13	4
Machinery	43	19	61	6
Electrical machinery	18	16	45	10
Transportation equipment	2	0	4	0
Other manufacturing	6	7	8	2
All manufacturing	100	100	20	5
Absolute values	182 650	41 850		

Sources: Swedenborg [1973], Tables 15 and 16, Samuelsson [1977], Tables 2:2 and 2:3.

importance: between 1970 and 1974 the foreign employment share in this industry increased from 6 to 11 per cent. (Samuelsson [1977], SCB 1974.)

In short, there is a two-way flow of direct investment in most Swedish industries. Inward investment appears to be more concentrated in industries in which Sweden has a comparative advantage (as seen, e.g., in the export and foreign investment propensities) than is the outward investment of the U.S. and the U.K. (metals, non-electrical and electrical machinery). An important reason for this seems to be that locational factors, especially Sweden's comparative advantage in these industries, have favored local production.[1]

Foreign ownership in Swedish industry appears to be relatively more important in those industries in which foreign firms appear to have a (firm-specific) competitive advantage vis-à-vis Swedish firms, namely, in industries where U.S. and U.K. outward investment is relatively larger than Swedish outward investment is (food products and chemicals).

3.5 Summary and conclusions

Comparisons between Swedish, U.S. and U.K. direct investment abroad have pointed up some similarities but also a number of dissimilarities in investment patterns of the three countries. The comparisons are crude and the results, therefore, are only suggestive of some factors that should be included in a "general" theory of direct investment.

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[1] Samuelsson [1977] finds support for this hypothesis in his analysis of foreign involvement in 120 Swedish manufacturing industries.
Several studies have shown Sweden as having a comparative advantage in production requiring relatively large amounts of skilled labor. (Hufbauer [1970], Ohlsson [1976], Carlsson and Ohlsson [1976] and Carlsson and Sundström [1973]. Samuelsson [ibid], finds that a high skill intensity in production, measured as average wage per worker, is the most important factor affecting the choice between exports to and production in Sweden by foreign firms. The higher the skill intensity in an industry, the higher is the propensity to supply the Swedish market through local production.

Some of the differences between Swedish direct investment, on the one hand, and U.S. and U.K. investment, on the other, are probably differences between small and large countries. The relatively negligible Swedish direct investment in raw materials extraction is one example. The small size of the Swedish market, coupled with the large scale on which most raw materials extraction is undertaken help explain this. To the extent that Swedish firms have invested in raw materials production abroad it has not been "backward vertical integration" but "horizontal" investment in that it has meant producing abroad what is already produced at home for export. The motive seems to have been the profitable exploitation of know-how gained in extracting and processing the same resources in Sweden (iron ore and forest products).

The relatively larger foreign sales, and the lower proportion of these sales supplied through foreign production, of Sweden compared to the U.S. also seem explainable by country size. The small size of the home market means that growth by Swedish firms inevitably leads to foreign expansion. The relatively small distance to major markets for a small European country and the fact that domestic sales are not large enough to allow exploitation of scale economies in production help explain the relatively large proportion of foreign sales supplied through exports rather than through production in other countries.

Differences in the present regional distribution of the foreign investment of the three countries are largely due to political and cultural ties and/or geographic proximity, either of which could be subsumed under the euphemism "traditional commercial ties". Examples are the relatively large investments by the U.K. in the Commonwealth countries, by the U.S. in Canada and by Sweden in the other Nordic countries. The recent growth of direct investment, or of foreign production, in different regions has been more similar and is consistent with the expectation that, e.g., market size and trade barriers should exert a similar influence on potential foreign investors in different countries.

The absence of any clear pattern in the industry composition of direct investment from the three countries has, I believe, more fundamental implications for the theory of international investment. It requires recognition that inherent industry characteristics are not necessarily related to the firm-specific advantage thought characteristic of foreign investors. Industries that are relatively major foreign investors in one country are not that in another country and vice versa. Instead, different countries have differing comparative advantages in foreign investment just as they do in foreign trade. The two are probably related but not in a simple way which makes it possible to explain the industry distribution of foreign investment by the industry distribution of a country's exports or imports. Other factors, such as tradability, production costs, etc., also enter into the choice between foreign production and exports or domestic production and imports. In addition, dynamic-historical factors, such as when the foreign investment by different countries was undertaken, have an important bearing on the distribution of the current stock of capital. This will be brought out in the analysis of differences in foreign production among Swedish firms in Chapters 5 and 6.

However, industry aggregates such as those looked at in this chapter not only conceal important differences between subindustries, but also considerable differences between firms. In most investing countries a relatively small number of firms account for the bulk of foreign investment.[1] For a country like Sweden such concentration of foreign investment means that a handful of big companies strongly influence the industry distribution

[1] See, e.g., Reddaway [1967] and Chapter 6.

of investment abroad. For example, two firms account for the overwhelming portion of direct investment in the chemical industry. Only one firm accounts for more than half of Swedish direct investment in the machinery industry. The same is true in the electrical machinery industry. Overall only 10 firms account for as much as 75 per cent of total Swedish investment abroad. The current industry pattern of Swedish foreign investment can hardly be explained without reference to these large, and old, foreign investors.

The strong dominance by a small number of firms raises the question of whether - in the Swedish case - it is at all meaningful to try to explain the pattern of foreign investment in terms of industry characteristics. Or put in another way, it suggests that firm characteristics are also important determinants of the pattern and volume of foreign investment. The following chapters are devoted to an analysis of inter-firm differences in the volume of foreign production and exports. This is in line with the theory of direct investment which, by its emphasis on firm ownership and firm-specific advantage, is ultimately a theory of the size and growth of firms.

Chapter 4

Formulation of Hypotheses, the Model, Sources and Uses of Data

The theory of international investment presented in Chapter 2 yields implications regarding international production and exports by individual firms. Here we will state these implications in such a way that the determinants of international production can be analyzed using cross-sectional data for Swedish firms. We will also specify the independent variables to be used and the relationships to be tested by regression analysis.

Section 4.1 below is thus intended as a bridge between the theoretical propositions set out in Chapter 2 and the model underlying the empirical analysis, which is presented in 4.2. Section 4.3 describes sources and uses of data and section 4.4 contains the regression model.

4.1 Hypotheses regarding inter-firm differences in foreign production

A framework for analysis

The determinants of foreign production set out in Chapter 2 may be analyzed within the theoretical framework of a firm serving many national markets and having the option of producing in different countries. The following simple model of a profit-maximizing, single-product firm in a two-country setting provides a useful starting point for analysis.[1]

[1] This kind of model has been developed by Horst [1969].

We assume that the firm faces a less than infinitely elastic demand both at home and abroad. We also assume that domestic sales come from domestic production, while foreign sales can be supplied both through exports from the home country and through production abroad. For simplicity we specify that the firm's cost and revenue functions are log-linear and constant over time. We also abstract from the firm's optimal use of factors of production.

Our assumptions yield the following cost and price functions for the firm

$$C_H = \psi_H Q_H^{\alpha_H} \tag{4:1}$$

$$C_A = \psi_A Q_A^{\alpha_A} \tag{4:2}$$

$$P_H = \phi_H (Q_H - S_X)^{\beta_H} \tag{4:3}$$

$$P_A = \phi_A (Q_A + S_X)^{\beta_A} \tag{4:4}$$

where

$$S_X = Q_H - S_H \tag{4:5}$$

and where

Q_H = production in the home country

Q_A = production abroad

S_H = sales in the home country

S_X = exports

Q_A+S_X= sales abroad

P_H = home country price

P_A = foreign price

C_H = costs in home country production

C_A = costs in foreign production.

The parameters in equations (4:1)-(4:4) have the following meaning. ψ_H and ψ_A are measures of the efficiency in domestic and foreign production, while α_H and α_A are measures of economies of scale in domestic and foreign production respectively. ϕ_H and ϕ_A can be seen as measures of the size of the home and foreign market. β_H and β_A measure the price elasticity of demand at home and abroad. By setting $\psi_H = \psi_{H0}e^{-\lambda_H t}$ we can allow for technical progress over time (due, e.g., to learning-by-doing). $-\lambda_H t$ then shows the annual downward shift in the home cost function.

The firm's profit function is

$$\Pi = P_H(Q_H-S_X) + P_A[(1-t)S_X + (1-s)Q_A] - C_H - C_A \tag{4:6}$$

where t represents tariff and transportation costs for exports as a percentage of the sales value of exports (ad valorem) and s represents special taxes or costs associated with foreign production as a percentage of the sales value of foreign production.

Assuming that the α- and β- parameters have values such that an interior optimum solution exists, profit maximization with respect to the firm's decision variables Q_H, S_X and Q_A yield the following conditions for optimum.

$$\phi_H(\beta_H+1)(Q_H-S_X)^{\beta_H} = \psi_H\, \alpha_H\, Q_H^{\alpha_H-1} \tag{4:7}$$

$$\phi_A(\beta_A+1)(Q_A-S_X)^{\beta_A} - t\, S_X\, \phi_A\, \beta_A\, (Q_A+S_X)^{\beta_A-1} - s\, Q_A\, \phi_A\, \beta_A\, (Q_A+S_X)^{\beta_A-1} - \phi_A\, (Q_A+S_X)^{\beta_A}\, s = \psi_A\, \alpha_A\, Q_A^{\alpha_A-1} \tag{4:8}$$

$$\phi_h(\beta_H+1)(Q_H-S_X)^{\beta_H} = \phi_A(\beta_A+1)(Q_A+S_X)^{\beta_A} - t\ S_X\ \phi_A\ \beta_A\ (Q_A+S_X)^{\beta_A-1} -$$

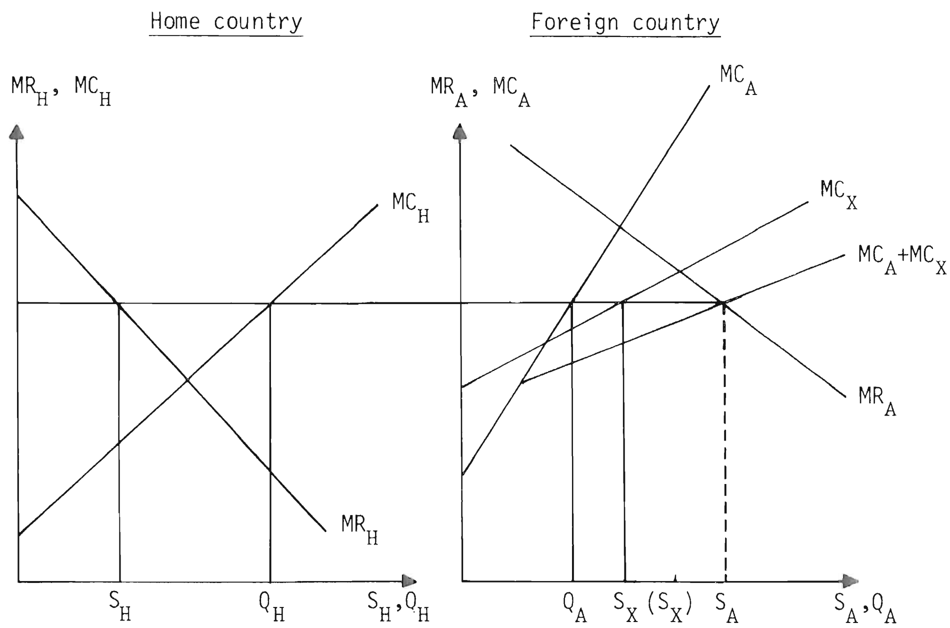
$$- s\ Q_A\ \phi_A\ \beta_A\ (Q_A+S_X)^{\beta_A-1} - t\ \phi_A\ (Q_A+S_X)^{\beta_A} \qquad (4:9)$$

Equation (4:7) states that production at home should be carried to the point where marginal cost of home production equals marginal revenue from domestic sales. Equation (4:8) states that production abroad should be carried to the point where marginal cost of foreign production equals marginal revenue from foreign sales. If t and s are positive, marginal revenue abroad must be adjusted because a lower P_A due to an increased volume of foreign sales reduces tariff costs on exports and tax on foreign production. This is shown by the second and third term, i.e., $-t\ \frac{dp}{dq}$ and $-s\ \frac{dp}{dq}$, which are positive. The fourth term shows the loss in foreign marginal revenue due to the tax on the increase in foreign production. Equation (4:9) states that domestic and foreign sales should be such that marginal revenue at home equals marginal revenue abroad adjusted for the effect of t and s.

We can illustrate this simple model diagrammatically as in Figure 4:1. The firm is represented as a price searcher and faces a negatively sloped demand curve for its product both at home and abroad.[1] The corresponding marginal revenue curve is MR_H. Supply in the home country is equal to the firm's marginal cost schedule for domestic production, MC_H. The export supply schedule, MC_X, corresponds to the horizontal distance between MC_H and MR_H. Therefore, marginal cost equals marginal revenue in the exporting country at all points along it. Total supply in the foreign market, $MC_A + MC_X$, is equal

[1] This means either that the firm is big enough relative to its market to have a noticeable effect on price or that the firm, big or small, produces a differentiated product which gives rise to a separate demand for its products. The assumption of a price searcher is not an idle assumption in this context. It must hold at least in the home market if the firm is to have determinate levels of sales in both countries. If the firm were a price taker, facing a perfectly elastic demand at the going world price in both countries, it could sell all its output in either market and there is no way of determining how much the individual firm will end up selling in each.

Figure 4:1 Determination of the firm's sales and output in two countries



The conditions for profit maximization are:

$MC_H = MR_H$

$MC_A = MR_A$

$MR_H = MR_A$

to the firm's export supply plus its foreign supply schedule. Where it intersects the marginal revenue curve abroad, MR_A, the firm's profit is maximized. This gives the optimal volume of sales abroad, S_A. The quantity S_X is exported and Q_A is produced abroad. The equilibrium level of sales in the home country is S_H.[1] The firm's choice between exports and foreign production is determined by the condition that the marginal cost of exporting equals the marginal cost of foreign production.[2]

The diagrammatic representation allows us to draw the following conclusions: If the firm has the option of using both sources of supply, total output will be greater, price will be lower and sales larger in both countries than would have been the case with exports the only source of supply. The effect of allowing foreign production is, furthermore, the displacement of exports from (S_X) to S_X. In the single product case, the export displacement will always be positive.[3] More will be said of the effects of constraints on foreign production in Chapter 7.

Extending the above model to a multiproduct firm one would have to show the determination of sales and output for each of its products and also take account of substitution and complementarity effects between products. This case could show the firm exporting one product to and importing another product from the same country. Such a model, which is particularly relevant to the analysis of the interrelationship between exports and foreign production in Chapter 7, is presented in Appendix A.

[1] Note that $S_X = Q_H - S_H = S_A - Q_A$.

[2] This rule applies to rising marginal costs. With constant or decreasing marginal costs in both countries, the firm will use only one source of supply. (See Horst, ibid.)

Since foreign investors typically both export and produce abroad production must be characterized by rising marginal cost in the relevant range of output. But this applies to the single product firm, or the firm producing the same product in more than one location. For the multiproduct firm it is clearly possible that marginal cost for each product is constant or decreasing.

[3] Note that this effect would not exist if foreign demand were perfectly elastic.

Country, industry, and firm determinants of foreign production

The factors affecting the firm's cost and revenue schedules in Figure 4:1, and the parameters in equations (4:7)-(4:9), are those that were discussed in Chapter 2. They may be divided into those that are characteristics of countries, industries, and firms respectively. The significance of the first two were discussed under the heading of trade and location theory, while the third was discussed in the context of the theory of the firm.

Country characteristics determine the position and shape of the firm's cost and revenue schedule in the home country relative to those in the foreign country. They include the size of the foreign market relative to the home market and the cost of inputs (capital, labor, and purchased materials) abroad relative to costs at home. Only costs of relatively immobile inputs, e.g., labor and natural resources, will differ between countries and affect location. In addition, the foreign country's tariff structure and tax system are country characteristics which affect location. The effect of an *ad valorem* tariff (based on the price in the exporting country), for example, is to shift up the export supply schedule, thereby reducing imports and sales but increasing output abroad and reducing output but increasing sales in the home country.

Industry and firm characteristics affect the position and shape of these schedules relative to those of other firms *within* each country. Industry characteristics are relevant insofar as firms in different industries are compared. By industry we mean a collection of firms producing similar output using similar technology. Then, industry characteristics include relative factor use (capital-, skill-, R&D- and natural-resource-intensity), economies of scale, product mobility, and the size of the industry's market. Such industry characteristics influence the volume of foreign production through their effect on the relative cost of production at home and abroad at given output levels. They also make for differences in the role of trade barriers and in the profitability of locating production close to the market. For example, if the home country has a relatively high price of unskilled labor, the marginal cost of foreign production relative to domestic production will tend to be lower for firms in an industry characterized by a low capital and skill intensity in production, relative to other industries. Such a firm will therefore tend to locate a larger proportion of its output abroad than will those in the other industries. In terms of Figure 4:1, Q_A/Q_H will be larger (and S_X/S_A smaller) for firms in this industry relative to firms in other industries.

Firm characteristics are those attributes which serve to differentiate firms within a given industry. They include sources of a firm-specific advantage such as patented products, successful product differentiation and special marketing skills on the demand side and patented technology and accumulated know-how on the supply side. These are all knowledge- or human-capital-related advantages, which may be assumed mobile within the firm and across countries. A firm-specific advantage causes firms to be bigger at home than they otherwise would be and, in particular, enables them to overcome the presumed disadvantage of selling and producing in a foreign country. If foreign markets typically are larger than the home market, a firm-specific advantage - in the form of, e.g., proportionately lower costs both at home and abroad than competitors in the same industry - also implies that foreign sales will be larger relative to domestic sales (S_A/S_H) for such a firm. However, a firm-specific advantage does not by itself affect the location of production.

Thus, we may say that the firm's foreign production will be larger, the greater its firm-specific advantage vis-à-vis other producers in the same industry (both at home and abroad) and the lower the cost of immobile factors of production abroad relative to at home or the higher are barriers to trade. Looking across industries we may say that more firms will tend to be foreign investors in some industries than in others due to industry differences in the role of scale economies, resource orientation, relative factor use, etc. These are the basic propositions put forth in Chapter 2 and ones that we will want to test.

Time, the time sequence of growth,and alternatives to foreign production

Actual size differences between firms at home and abroad cannot be explained solely in terms of industry and firm characteristics, even assuming that these could be properly specified. A time dimension must also be brought into the analysis. The firm's current size is the result of its past rate of growth and its age. If growth costs impose restrictions on the maximum profitable rate of growth in each period, then the firm's current size depends crucially on when it was started up. The older the firm is, ceteris paribus, the bigger it will be. While the firm's rate of growth relative to that of the industry is related to the firm-specific advantages discussed above, the point at which it started growing is simply a historical datum.

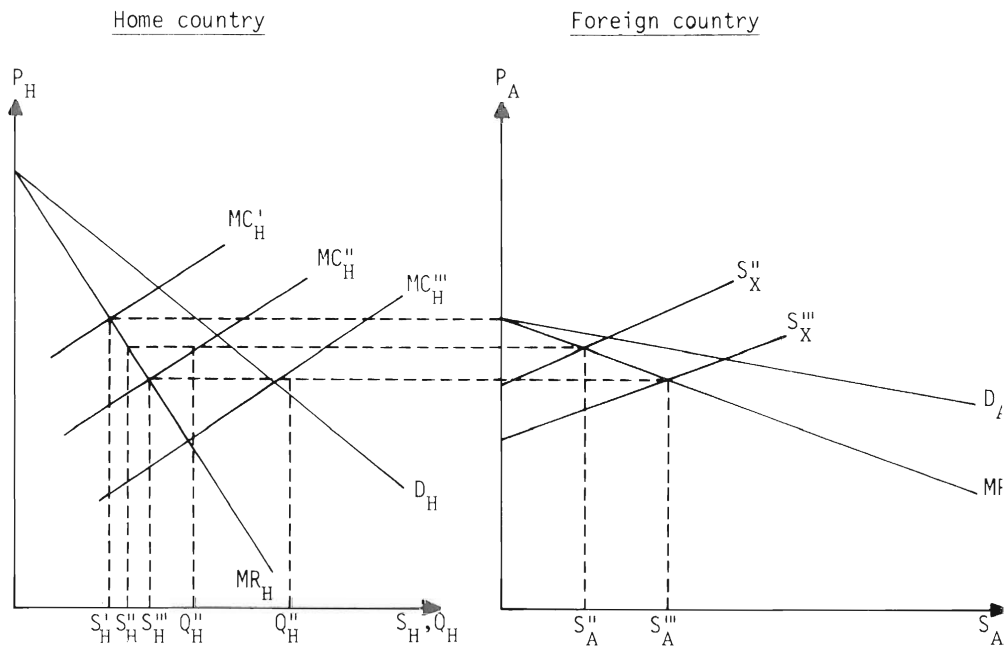
Time plays a role not only because it affects the cost of growth and of adjustment generally. It also affects production costs through learning-by-doing, as noted in Chapter 2. The longer the firm has been producing a given output, the more learning has been accumulated and the more productive are the resources in the firm. Employees become more skilled, plants and equipment are trimmed to reduce malfunctions and stoppages, administrative routines become streamlined, etc. Thus, an older firm will, ceteris paribus, be larger because it has lower costs than younger firms do.

The age of the firm enters the analysis also because foreign sales and production are unlikely to grow proportionately with domestic sales and production over time. A more likely sequence of events is that the firm first expands its sales and output in the home market and turns to exporting and foreign production only after it has become relatively large in the home market. Such a sequential growth pattern can be explained in terms of lower information and trading costs in the home market and in terms of the existence of economies of scale in production. It can also be explained by different price elasticities of demand in the home market and in foreign countries.

Figure 4:2 depicts the demand curves at home and abroad that a firm in a relatively small country might face. Demand in the home market is much less elastic than demand in foreign markets. Therefore, at low volumes of sales the firm will sell only in the home market. As the firm grows and expands its sales in the home country, price and marginal revenue at home will fall. At some volume it will become profitable to start selling in foreign markets, where the potential for sales expansion is much larger due to the higher elasticity of foreign demand.

If domestic growth precedes foreign growth, and given that it takes time to grow large in foreign markets, both the volume of foreign sales and production will depend on <u>when</u> the firm reached the critical size in the home market and started growing in foreign markets. If, moreover, foreign demand is typically more elastic than home demand, foreign sales growth will, once started, exceed domestic growth.

Figure 4:2 Domestic and foreign sales for a growing firm



MC'_H, MC''_H and MC'''_H are the consecutive marginal cost schedules of a growing firm. For $Q_H > S_H MR_H$ and MR_A can be equated and the firm will be an exporter.

Finally, we note that in explaining size differences between firms in their foreign sales and production it is necessary to take account of the fact that there are alternative growth routes. Diversification into new product markets is an alternative to diversification into new geographic markets and licensing a foreign producer is an alternative to the firm setting up its own production facilities abroad. The firm choosing to enter new product markets in the home country instead of foreign markets for its original product or product bundle will be larger if and when it ventures abroad. The firm whose competitive advantage is not completely firm-specific might find it more profitable to transfer its intangible assets to foreign producers through the sale of patent rights, licenses, etc. Its foreign operations are also likely to be smaller than they otherwise would have been.

4.2 An econometric model of foreign production

A general formulation of our theoretical model, based on equations (4:7)-(4:9), is:

$$f_1(Q_H, S_X, \mu_1, \ldots, \mu_n) = 0 \qquad (4:10)$$

$$f_2(S_X, Q_A, \mu_1, \ldots, \mu_n) = 0 \qquad (4:11)$$

$$f_3(Q_H, S_X, Q_A, \mu_1, \ldots, \mu_n) = 0 \qquad (4:12)$$

where Q_H, S_X, Q_A are endogenous variables and $\mu_1, \ldots, \mu_n$ are the parameters in the cost and revenue functions. Some of these parameters are not constant but are functions of the exogenous variables discussed above. In the full model, therefore, these functional relationships replace the relevant parameters in equations (4:10)-(4:12). In Appendix A we indicate how the exogenous variables to be used in the empirical analysis are related to the theoretical model. We also show the model in structural and reduced form.

Structural equations show each endogenous variable as a function of the other endogenous variables, as in (4:10)-(4:12), and of a set of the exogenous variables. In the reduced form the endogenous variables have been eliminated from the right hand side of the equations and each endogenous variable is instead a function of all the exogenous variables in the system. The reduced form summarizes the comparative statics of the model, i.e., it compares two equilibrium values of the endogenous variables when only one of the exogenous variables changes. The coefficient of each exogenous variables shows the partial effect on an endogenous variable of a change in a particular exogenous variable.

The coefficients of the endogenous variables in the structural form have a different meaning. Since an endogenous variable can only change when there is a change in an exogenous variable, the coefficients show the interrelationship between the endogenous variables which arises via the equilibrium conditions of the model, in our case, via the conditions for profit maximizatio They cannot be interpreted as showing the effect of a change in an endogenous variable. It is different if one of the endogenous variables is regarded as a policy parameter and, hence, subject to exogenous changes. This question, which is relevant to the topic of Chapter 7, is taken up in Appendix A.

We will estimate the coefficients in the reduced-form equations and in "quasi-reduced-form" equations, i.e., equations where an endogenous variable is included as an explanatory variable. The reduced-form equations are used to analyse the determinants of foreign production and exports in Chapter 5. "Quasi-reduced-form" equations underlie our analysis of the relationship between domestic and foreign size in Chapter 6, and, especially, our analysis of the effect on exports of foreign production controls in Chapter 7. In the latter analysis the volume of foreign production is regarded as a policy parameter and, therefore, as an exogenous variable in the model.

Variables and functional relationships

Below we present a simple econometric model which allows us to examine the underlying determinants of inter-firm differences in the volume of exports and foreign production. It captures the basic set of hypotheses formulated in this chapter and to be tested in the empirical analysis.

Table 4:1 summarizes the variables of the model. These variables, clearly, do not exhaust the list of potentially important determinants of inter-firm differences in domestic and foreign size. They do, however, correspond to some of the more important theoretical variables discussed earlier. They also include the more important ones used in earlier empirical work.

Firm and industry characteristics vary across firms within an industry and across industries respectively. Country characteristics vary across countries. The influence of firm-specific factors, including YR, is a test of the role of a (firm-specific) knowledge advantage based on innovation and learning. The YR-variables, in addition, will supply evidence on the validity of a sequential growth pattern. The influence of industry and country characteristics is a test of our hypotheses regarding factors which affect the location of production and trade flows.

The functional relationships are shown by equations (4:13)-(4:15). The equations are structural insofar that they contain variables, both endogenous and exogenous, which, we expect, should be present in the theoretical structural equations. The expected influence of the exogenous variables is indicated by the sign below the variable.

Table 4:1 Variables of the simultaneous-equation model of foreign production

Endogenous variables

(1) S_H = home country sales
(2) S_X = exports
(3) S_Q = foreign production sold abroad (locally)
(4) $Q_H = S_H + S_X$ = home country production
(5) Q_A = foreign production
(6) Div. = the amount of product diversification

Exogenous variables

Firm-specific factors (i)

R&D = R&D intensity
LS = labor skill measure
YR_H = age of the firm
YR_X = length of time the firm has exported
YR_Q = age of foreign manufacturing

Industry characteristics (I)

WS_H = size of the industry's market at home
WS_A = size of the industry's market abroad
KL = capital intensity
NR = natural resource intensity
SC = scale economy measure
T = product tradability

Country characteristics (j)

w_j/w_H = ratio of foreign to domestic wages
TU = country trade policy

$$S_{H_{iI}} = f_1\{S_X,\ S_Q:\ (\underset{+}{R\&D},\ \underset{+}{LS},\ \underset{+}{YR_H})_i,(\underset{+}{WS_H},\ \underset{+}{KL},\ \underset{+}{NR})_I\} \tag{4:13}$$

$$S_{X_{iI}} = f_2\{S_H,\ S_Q;\ (\underset{+}{R\&D},\ \underset{+}{LS},\ \underset{+}{YR_X})_i,\ (\underset{+}{WS_A},\ \underset{+}{KL},\ \underset{+}{NR},\ \underset{+}{SC},\ \underset{+}{T})_I\} \tag{4:14}$$

$$S_{Q_{iI}} = f_3\{S_H,\ S_X;\ (\underset{+}{R\&D},\ \underset{+}{LS},\ \underset{+}{YR_Q})_i,\ (\underset{+}{WS_A},\ \underset{-}{KL},\ \underset{-}{NR},\ \underset{-}{SC},\ \underset{-}{T})_I\} \tag{4:15}$$

Equations (4:13)-(4:15) state that the firm's size both at home and abroad relative to other firms in the same industry depends on its firm-specific knowledge advantage, which we assume is related to its R&D effort (R&D) and the skill level of its labor force (LS). It also depends on dynamic-historical factors, such as when it started growing in the home market (YR_H) and in foreign markets (YR_X, YR_Q) respectively.

Looking across firms in different industries the firm's size at home and abroad depends on industry differences in market size at home and abroad (WS_H and WS_A, i.e., world sales by industry I at home and abroad respectively). The home country is assumed to be a high wage country and to be relatively well endowed with certain natural resources. Hence, firms which are in industries characterized by a high capital intensity in production (KL),or low labor intensity, and firms in industries which intensively use domestically available natural resources (NR) are expected to have a comparative advantage both in producing for the home market and in exporting to foreign markets. At the same time, they are less prone to locate production abroad. Two other industry characteristics affect the firm's locational choice, namely, the existence of scale economies in production (SC) and product tradability (T). Scale economies affect the firm's choice between foreign and domestic production primarily by discouraging it from setting up foreign production before such economies have been fully exploited at home. A high degree of product tradability, finally, facilitates exporting and removes an incentive to locate production abroad.

Comparing exports and foreign production in different countries it is necessary to take account of different country characteristics. In equations (4:16) and (4:17) subscript j refers to variables which vary across countries.

$$S_{X_{iI_j}} = f_4\{S_H, S_{Q_j}; (\underset{+}{R\&D}, \underset{+}{LS}, \underset{+}{YR_{X_j}})_i, (\underset{+}{WS_j}, \underset{+}{KL}, \underset{+}{NR}, \underset{+}{SC}, \underset{+}{T})_I, (\underset{+}{w_j}/w_H, \underset{+}{TU_j})_j\} \qquad (4:16)$$

$$S_{Q_{iI_j}} = f_5\{S_H, S_{X_j}; (\underset{+}{R\&D}, \underset{+}{LS}, \underset{+}{YR_{Q_j}})_i, (\underset{-}{WS_j}, \underset{-}{KL}, \underset{-}{NR}, \underset{-}{SC}, \underset{-}{T})_I, (\underset{-}{w_j}/w_H, \underset{-}{TU_j})_j\} \qquad (4:17)$$

The length of time the firm has been exporting to and producing in a particular country (YR_{X_j}, YR_{Q_j}) now captures the fact that it takes time to break into markets and to build up production capacity in each country and that learning is associated with these activities. Country differences in market size (WS_{I_j}), in relative wages (w_j/w_H) and in trade policy (TU_j) affect exports and foreign production and the choice between them. Differences in resource endowment would, too, but such a variable has not been included.

Since production may be established in one foreign country but be sold in another foreign country (or in the home country) the above equations can be supplemented with ones where Q_H and Q_j (domestic and foreign production regardless of where the output is sold) are dependent variables. Factors affecting location are likely to play a stronger role, while country difference in demand are likely to be less important in such a formulation.

The relationship between the endogenous variables is more complex and cannot be stated unambiguously on the basis of a simple model. For example, the relationship between domestic and foreign sales in a simple model such as the one presented on p. 73-78 should be one of substitution. On the other hand, according to the sequential growth hypothesis, domestic size determines the point at which firms venture abroad for the first time. We can test the latter hypothesis in the following form:

$$P(S_X) = f_6\,(S_H/WS_H) \tag{4:18}$$

$$P(S_Q) = f_7\,(S_H/WS_H) \tag{4:19}$$

Equations (4:18) and (4:19) state that the probability that the firm sells abroad is higher the larger its share of the home market. We can also test the hypothesis that diversification to other product markets is an alternative to geographic sales diversification by including a measure of product diversification.

Firm size may have other effects, too. The oligopoly theory of foreign investment discussed in Chapter 2 stresses the role of both absolute and relative firm size as an indirect determinant of foreign involvement, working via oligopolistic market behaviour or economies of firm size. Since such aspects are not easily incorporated into a simple model, we will defer a discussion of these questions to the empirical sections.

The relationship between exports and foreign production depends on the presence of complementarity and substitution between products produced at home and abroad. Denoting exports of complements by S_{XC} and exports of substitutes by S_{XS} we expect the relationship between foreign production and the former to be positive and between foreign production and the latter to be negative. The net effect on total exports depends on the relative strength of these two effects. This will be discussed further in Chapter 7.

Modifications in the model imposed by available data

Modifications in the above econometric model must be made for data reasons. In particular, we lack data on the size of the industry's market for each firm both at home and abroad (WS_H and WS_A).[1] We also lack data on the age of the firm (YR_H) and on the length of time it has been exporting (YR_X).

Given that the analysis cannot be performed within reasonably homogeneou industry groups[2] and given that we lack a market-size variable, we cannot analyze the influence of firm-specific factors and industry characteristics on the competitive advantage of firms. Size differences between firms both at home and abroad will then mainly reflect size differences between their respective markets.

A less satisfactory but still an alternative way in which one might try to control for size differences between firms due to differences in market size is to deflate the firm's exports and foreign production by the firm's size in the home market. The dependent variables would then be S_X/S_H and S_Q/S instead of the theoretically correct S_X/WS_A and S_Q/WS_A implied in equations (4:14) and (4:15) above.

There is a link between, what we may term, the propensity to sell abroa

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[1] Needless to say it would be a formidable task at any reasonable level of ag gation to calculate WS_A. It is even impossible to calculate WS_H because our d on domestic sales by foreign investors are consolidated between plants and su sidiaries, i.e., eliminates sales between them, while census data on industry sales, exports and imports are not. Hence, each firm's domestic market share would be underestimated to an extent determined by the volume of such sales. addition, the quality of census data on domestic consumption by product group is also unreliable due to difficulties in eliminating inter-industry sales. F a number of product groups no consumption figures are given in the cen us dat Attempts to nonetheless calculate market shares resulted in unreasonable valu

[2] The limited number of foreign manufacturing investors (some 100 firms) and heterogeneity of their activities preclude comparisons of firms within indust at a reasonable level of disaggregation. Even apart from this, it is difficul to maintain a clear distinction between industry and firm characteristics wit respect to how they affect the foreign production activities of firms. For example, R&D intensity is both a characteristic of an industry and can form t basis for a firm-specific advantage.

$(S_X+S_Q)/S_H$, and foreign market shares. The correspondence would be exact 1) if the pattern of foreign relative to domestic demand is the same as between firms and 2) if firms which produce abroad hold the same share of their respective home market. Of course, these conditions are not likely to be met in any exact way. What one can say, however, is that if condition 1) is a reasonable approximation, firms which display relatively high ratios of foreign to domestic sales are relatively more competitive in foreign markets than firms which display lower ratios. If, furthermore, domestic growth precedes foreign growth, as has been argued above, so that foreign investors are relatively large in their home market, there is a plausible link between the propensity of firms to sell abroad and the competitive power of firms in foreign markets.

Redefining the dependent variables means that equations (4:14) and (4:15) are replaced by the following:

$$\left(\frac{S_X}{S_H}\right)_{iI} = f_7\{\frac{S_Q}{S_H}, S_H; (\underset{+}{R\&D}, \underset{+}{LS})_i, (\underset{+}{KL}, \underset{+}{NR}, \underset{+}{SC}, \underset{+}{T})_I\} \qquad (4:20)$$

$$\left(\frac{S_Q}{S_H}\right)_{iI} = f_8\{\frac{S_X}{S_H}, S_H; (\underset{+}{R\&D}, \underset{+}{LS}, \underset{+}{YR_Q})_i, (\underset{-}{KL}, \underset{-}{NR}, \underset{-}{SC}, \underset{-}{T})_I\} \qquad (4:21)$$

where YR_X has been omitted from equation (4:20), since we lack information on this variable, too.[1]

It is clear that since a firm-specific advantage, and home country comparative advantage, causes firms to be large both at home and abroad, we are deflating by part of what we want to explain. Thus, we expect the influence of R&D and LS to be weaker in the new formulation. Similarly, the influence of KL and NR should be weaker in (4:20), while it is likely to be

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[1] It should be mentioned that dividing both S_X and S_Q by S_H might give rise to correlation between these variables simply through their common denominator. This would happen if there is little variation in S_X and S_Q relative to the variation in S_H. However, the analysis in Chapter 6 involving absolute values of the endogenous variables suggests that this is not a problem.

stronger in (4:21) than in the earlier formulation. Due to the above link between the two sets of equations, however, we nevertheless expect that they will have the effects indicated by the signs.

For an analysis across countries we now allow for differences in country size and market characteristics by adding GDP and GDP per capita to the country equations.

The set of relationships to be tested in the empirical analysis will be summarized after we have discussed sources and uses of data.

OLS- and 2SLS-estimation

The significance of reduced-form estimating equations is that they allow estimation by ordinary-least-squares (OLS) regression technique without simultaneity bias. However, we want to do more than that. We also want to examine the relationship between domestic and foreign size and, in particular, we want to determine the effect on exports of controlling the volume of foreign production.

Our ambition in analyzing the former relationship can be satisfied through OLS-estimation, which, despite its large bias, "still has the advantag of simplicity and low variance and might still be utilized, particularly in preliminary work." (Intriligator [1978], p.419.) Our ambition with respect to the latter question puts more exacting demands not only on the specification of the underlying structural model but also on the choice of estimation technique.

Estimation by two-stage-least-squares (2SLS) is the preferred method for estimating simultaneous-equation systems. It is preferred because, compared to OLS, it yields estimates which are less biased and which are consistent in the probability limit (i.e., with a sufficiently large sample the estimator will have as high a probability as required of being close to the true population value).

2SLS-estimation means that one uses OLS to estimate, in the first stage, the endogenous variable whose effect one wishes to ascertain - in our case S_Q. In the second stage the estimated value of this variable ($\hat{S}_Q$) is substituted for its actual value in the "quasi-reduced form" equation (where S_X is the dependent variable). The estimated value is then an exogenous variable in the second estimating equation.

The second step requires that the first structural equation contains at least one exogenous variable which may be set equal to zero in the second structural equation. Given the structural equations in Appendix A, the YR variable in the foreign production equation should identify the exports equation, because it affects the cost of foreign production and not the cost of domestic production (nor demand at home and abroad). Hence, we can use 2SLS to analyse the partial effect on exports of exogenous changes in foreign production.

4.3 The empirical data and definitions of variables

The data

The main body of data which we will be using has been collected at Industriens Utredningsinstitut (IUI) in two census operations (in 1971 and 1975 respectively). It consists of information regarding all Swedish manufacturing firms with foreign affiliates and minority interests abroad for the years 1965, 1970 and 1974. The coverage is complete with respect to the largest foreign investors and nearly so with respect to firms with less sizeable foreign involvement. (An estimated 90 % of firms in the latter category are included.)[1]

Firms are divided into two groups: those which have manufacturing affiliates abroad and those which only have sales affiliates (or other non-manufacturing affiliates or minority interests) abroad. In any one year there are approximately 100 Swedish firms in the former group and some 150 in the latter group.

Data for firms with manufacturing activities abroad consists of detailed information regarding the Swedish parent firm (the consolidated group) and each manufacturing affiliate abroad. It includes such variables as sales, value added, trade flows, factor use, product mix, etc. More limited information is available for firms with sales affiliates abroad only.

The IUI data set is supplemented with variables computed from the census of manufactures and trade statistics and country characteristics (GDP and GDP per capita) from Kravis, Heston and Summers [1978].

The data allows various types of cross-sectional analysis: cross-sections across Swedish parent firms, across foreign manufacturing affiliates holding parent company (or industry) constant and across foreign manufacturing affiliates holding country constant.

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[1] A description of the survey, along with the questionnaire forms, is given in Appendix B. See also Swedenborg [1973] and [1976].

Measures of the independent variables

In this section we will present empirical measures of the independent variables specified in the model as well as a rationale for their use. Exact definitions of both the dependent and the independent variables are given in the variable list at the end of the chapter. Here, the discussion is organized according to whether the variables are characteristics of firms, of industries or of countries respectively.

Firm characteristics are proxies for a firm-specific advantage (R&D, LS), the degree of product diversification (Div.) and the length of time the firm has been producing abroad (YR_Q, henceforth YR).

R&D intensity and labor skills are clearly very crude proxies for a firm-specific advantage.[1] However, exact measures are not available and it has become standard practice in applied trade theory to use measures of R&D-, skill- and advertising-intensity to capture the rôle of intangible assets in the form of human capital. We have data only for the first two. Of these, R&D may be expected to reflect a knowledge advantage based on a higher rate of technical progress. Labor skills may reflect both general and firm-specific knowledge.

R&D intensity is measured as the ratio of the firm's current R&D expenditures to sales. It uses R&D effort as a proxy for R&D results. Although there should be some correspondence between the cost of inputs and the value of output over a longer period of time, this need ob-

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[1] The theoretical definition of which, it will be recalled, was intangible assets capable of being exploited through foreign production and whose value to the firm exceed that which can be realized by transferring them to other firms.

viously not be the case at any time. The evidence on the correlation between the two is mixed. For example, Sherer [1965] finds a strong correlation between R&D expenditures and number of patents registered by the firm using company data. Cohen, Katz and Beck [1975], however, find no relation between R&D intensity and their indicators of R&D output in the pharmaceutical industry.

The firm's total R&D expenditures, regardless of whether R&D activities are located at home or abroad, are related to parent sales on the principle that R&D results are freely mobile within the international firm. It would be theoretically more correct to use total sales in the denominator, since the measure would then be independent of what we want to explain, namely, the proportion of output which is located abroad. We will use parent sales for comparability with studies on U.S. multinational firms which have used this measure. This choice implies that there will be a bias towards a positive relationship between R&D intensity and the propensity to produce abroad.[1]

Available measures of skill intensity for Swedish foreign investors are wages and salaries per employee and salaried employees as a per cent of employment. Both obviously are very crude measures of skill intensity. Salaried employees include groups with very different skill levels between which one would want to differentiate. The same is true for wage workers as a group. Since salary and wage levels should be related to the skill levels or human capital of labor, the former measure seems preferable.

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[1] Consider two firms which have the same volume of overall sales and the same overall R&D intensity, say, 1,000 and 10/1,000 respectively. One has 50 % of its output abroad and the other has 10 %. When R&D is related to parent sales the calculated R&D intensity of the former is 10/500, while that of the latter will be 10/900 due to the differences in the relative size of foreign production.

The amount of product diversification should ideally be related to the firm's sales of products other than its original product bundle. However, we have no way of identifying the firm's original product bundle. An alternative is to simply regard domestic sales outside its main industry as representing product diversification.[1] Then sales in other industries plus total foreign sales would represent the firm's total diversification (industrial and international).

However, I have chosen a rather different measure because it captures some other aspects of diversification, such as the number of products produced and the dispersion among them, which makes it suited as an independent variable. The measure is an application of the Herfindahl index (described by Berry [1971]) to the distribution of a firm's industrial activity.

$$\mathrm{Div} = 1 - \frac{\sum_i^n x_i^2}{\left(\sum_i^n x_i\right)^2}; \qquad 0 \leq \mathrm{Div} \leq 1$$

where the x_i's are values of the firm's output in industries 1 through n. For a firm producing only one product Div = 0, while for a firm producing an endless number of products Div = 1. Thus, high values of this index reflect a high degree of product diversification.

As noted by Berry [ibid] the index approximates fairly closely what is usually meant by product diversification. Most importantly, it takes account not only of the number of industries in which the firm is active but also of the distribution of its activity among those industries. Thus, a firm producing in a great number of industries but whose output is highly concentrated in only one of them (say, 95 per cent) will not be characterized as diversified according to this index. A firm whose output is equally divided among three or

[1] This measure was used by Wolf [1977] for a very similar analysis.

four industries, however, would. In fact, the more equally divided the firm's output among the industries in which it produces, the higher the degree of diversification.

The level of industry aggregation used in the measure (3-,4-,5- or 6-digit industry classification affects the value of the index for each firm as well as the ranking between firms. The choice depends on the weights one wants to attach to the different industry groups. Since what we are looking for is exhaustion of markets, we use 6-digit SNI (the Swedish counterpart to ISIC).

The index is calculated on the basis of the firm's total sales rather than of its home market sales only. Hence, overall product diversification is expected to affect international diversification.

The measure of the length of time the firm has been producing abroad is refreshingly simple. It is measured by the year of establishment of the firm's oldest manufacturing subsidiary, i.e., 1974 less year of establishment. In a country-by-country analysis YR_j refers to the age of the oldest manufacturing subsidiary in each country.

Industry characteristics are all factors which affect the location of production. They include the intensity with which domestically available natural resources are used (NR), capital intensity (KL), scale economies (SC) and product tradability (T), where the first two are intended to reflect the influence of the costs, at home and abroad, of relatively immobile factors of production.

Among the most natural resource intensive industries in Sweden are those that are dependent on Sweden's own natural resource base, that is, the paper and pulp industry and the iron and steel industry. The availability of these resources in Sweden should make firms in these industries relatively less prone to locate production abroad, at least in processes close to the resourc end. This bias will be handled by the use of a dummy variable.

Since wage rates in Sweden have been, and are, higher than in most industrial countries we expect a high capital intensity (a low labor intensity) to favor production in Sweden and a low capital intensity to be an incentive to produce abroad. Capital intensity is measured as the ratio of (the book value of) property, plant and equipment to employment (number of employees). It is the firm's domestic capital intensity. It assumes that the firm produces roughly the same output mix both at home and abroad, i.e., that it has not adapted to a relatively lower price of foreign labor by locating most of its labor intensive production abroad.[1]

Several measures of scale economies are mentioned in the literature.[2] However, we are forced to consider measures available in census data and have chosen average value added per plant in each industry. For firms producing in more than one industry the measure is calculated for each industry in which it produces and then weighted by the proportion of the firm's output accounted for by that industry. The weights are the proportions of total output to take account of the fact that the composition of output at home and abroad may differ. For example, it is possible that the firm's domestic production is mainly in industries where scale economies are substantial while its foreign production is in those where they are not.

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[1] Adaptation to different relative factor prices abroad by Swedish firms appears to be mainly through changes in factor proportions rather than through changes in output mix. See the analysis of Lipsey, Kravis and Roldan [1978] based on the Swedish data.

[2] For example: One measure which would reveal if economies of scale constitute a deterrent against choosing foreign production is the number of plants accounting for 70 or so per cent of the company's domestic output. A high number suggests that scale economies are unimportant or are outweighed by high transport costs or other trade barriers.

$$SC = \sum_{i}^{n} \left(\frac{q_i}{q}\right) \left(\frac{\text{Value added}}{\text{No plants}}\right)_i$$

where q_i is the sales value of the firm's output in industry i. A high value of this measure is taken as an indication that the efficient plant size for the firm is large on the average, i.e., that economies of scale are large.

Differences in tradability as a result of (artificial and natural) trade barriers exist both between products and countries. I have not tried to compute tariffs and transportation costs for each firm's output sold in different countries. For an analysis of inter-firm differences in the choice between domestic and all foreign production, rather than in particular countries, an index of tradability for each firm's output has been calculated from census data. The index is defined as the volume of Swedish exports (X) plus imports (M) relative to consumption (C) in Sweden. Thus, both numerator and denominator are independent of the mix between exports and imports. The index has been calculated for the industries of each firm (5-digit SITC). For multi-product firms the index is, again, weighted by the proportion of the firm's total output accounted for by each product or industry. A high value of this ratio indicates a high degree of tradability.

$$T = \sum_{i}^{n} \left(\frac{q_i}{q}\right) \left(\frac{X+M}{C}\right)_i .$$

An obvious risk with this measure is that it may be tautological. Since Swedish foreign investors are mainly exporters and many account for a substantial part of total Swedish exports in each of their industries, the measure may serve as a proxy for the export prowess of these firms. (That is, the dependent variable S_X/S_H may be too large a component of $(X/C)_i$ above.)

The country characteristics that we will try to control for are: relative labor costs (w_j/w_H), the size of the foreign country (GDP), income per capita ($GDP_{cap.}$) and country trade policy (TU).

It is an open question whether differences in the price of labor between countries reflect solely differences in the marginal productivity of labor. While we do have information on wages paid by the firm at home and abroad, we do not have data which allow us to calculate the marginal productivity and, hence, the marginal cost of labor.

In constructing a measure of labor skills we assumed that wage differences within the country were related to differences in the quality of labor. Given the same amount of cooperating factors (physical capital, management, R&D) wage differences between countries should also reflect such quality differences.

Since cooperating factors are not available in the same proportions in all countries, and since trade may fail to equalize factor returns in different countries, the wage rate may underestimate the productivity of foreign labor to the multinational firm. If this is so, one could use the ratio of wages at home to wages abroad as a proxy for the ratio of the marginal cost of labor at home and abroad. If we exclude salaried employees and only use the average wage of workers in this measure we reduce the likelihood of measuring mainly differences in the mix of different grades of labor. On this reading the lower the wage rate in a particular ocuntry the more will tend to be produced in that country relative to other countries. The proxy is unsatisfactory, however, in that we do not know whether wage differentials reflect differentials primarily in labor quality or in labor costs.

The ratio of wages at home to those abroad are the total wage costs per wage worker (including employers' social security payments, payroll tax, remuneration for time not worked, etc.) of the firm in its domestic operations relative to its foreign manufacturing affiliates.

The expected influence of country size on each firm's foreign sales and production is straightforward. The larger the aggregate size of the foreign market, the larger the demand for goods, including goods supplied by Swedish firms and their foreign subsidiaries.

The influence of the income per capita variable, however, is ambiguous. On the one hand, it is a factor which may be expected to influence the demand for particular products and its inclusion is justified on the grounds that products sold by Swedish firms are likely to be adapted to demand in high income markets. On the other hand, since high income countries are also high wage countries, it is also a cost characteristic which may influence the location of production. The direction of this influence depends, again on the extent to which wage differentials correspond to productivity differentials.

Empirically we can discriminate between these hypotheses by the sign of the coefficient of the income per capita variable and by its differential impact, if any, on exports and foreign production respectively. As a demand characteristic it is expected to have a positive effect on both exports and foreign production, and as a cost characteristic it should affect exports and foreign production in opposite directions.

The size of the foreign market is measured as real GDP in U.S. dollars, corrected for non-equilibrium exchange rates, the size of the non-market sector in developing countries, etc. This measure, as well as real GDP per capita, has been obtained from Kravis, Heston and Summers [1975].

The fourth country variable is trade policy. I will try to capture some of the influence of country differences in tariff structure merely by differentiating between EFTA and all other countries using a dummy variable. Since Sweden is a member of EFTA, and therefore faces no tariffs on its exports to other member countries, the variable differentiates between countries which do and countries which do not have tariffs on Swedish exports.

4.4 Method of analysis and the regression model

Cross-sectional analysis of why firms produce abroad could be based on either of two kinds of inter-firm comparisons. One is a comparison of firms which produce abroad with those that do not and the other is a comparison among firms which actually produce abroad.

We will focus on a comparison of firms which are engaged in foreign production. That is, we will seek to identify and quantify the effects of those firm, industry and country characteristics that determine the extent of foreign manufacturing activities. This focus is motivated by available data. However, we will supplement this analysis with comparisons between firms with foreign manufacturing affiliates and firm with only sales affiliates abroad to see if there is a further difference between firms which do and do not produce abroad.

The hypothesized relationships will be tested by means of multiple regression analysis across firms and across both firms and countries. In the cross-firm regressions we will try to explain inter-firm differences in overall foreign sales and production. In pooled cross-firm and cross-country regressions we will try to explain such differences in sales and production in particular countries.

Tables 4:2 and 4:3 summarize the relationships to be tested in the empirical analysis and the expected influence of the exogenous variables and relationship between the endogenous variables. Firm and industry characteristics vary across firms, firm and country characteristics vary across both firms and countries, while country characteristics vary across countries only. (Definitions of all the variables are given in the variable list below.)

The relationships shown in Table 4:2 are the reduced form of the equations presented in section 4.2 above with one addition, namely, the one where the

Table 4:2 The expected relationship between the propensity to sell and to produce abroad and the exogenous variables

Dependent variable	Firm and industry characteristics						Firm and country characteristics		Country charact istics	
	R&D	LS	KL	NR	SC	T	YR_j	w_j/w_H	GDP_j	$GDP_{cap \cdot j}$
$\frac{(S_X+S_Q)}{S_H}$	+	+	?	?	?	?	?	?	+	+
$\frac{S_X}{S_H}$	+	+	+	+	+	+	?	+	+	+
$\frac{S_Q}{S_H}$	+	+	-	-	-	-	+	-	+	+
$\frac{Q_A}{Q_H}$	+	+	-	-	-	-	+	-	+	+

Table 4:3 The expected relationship between the propensity to sell and to produce abroad and the other endogenous variables

Dependent variable	S_H	S_X	S_Q	Div.
$\frac{S_X+S_Q}{S_H}$	-			-
$\frac{S_X}{S_H}$	-		?	-
$\frac{S_{XS}}{S_H}$			-	
$\frac{S_{XC}}{S_H}$			+	
$\frac{S_Q}{S_H}$	-	?		-
$P(Q_A)$	+			

propensity to sell abroad, $(S_X+S_Q)/S_H$, is the dependent variable. This relationship has been added because it is an analogue to the propensity to produce abroad, Q_A/Q_H, and also because we want to see what the net effects of the independent variables are on the relative volume of total foreign sales, which we expect to be (tenuously) linked to the international competitiveness of firms. Thus, the significance of factors associated with a firm-specific competitive advantage might be expected to be enhanced, while the significance of locational factors strongly reduced in this formulation.

The hypothesized influence of firm-, industry-and country characteristics set down in Table 4:2 will be tested in Chapter 5 in cross-sectional analyses across firms and countries.

The relationship between domestic size and foreign size set down in Table 4:3 is the subject of Chapter 6. There we will examine whether domestic size positively affects the probability that the firm is a foreign investor in a comparison of firms which do and do not produce abroad respectively. We will also examine whether the partial relationship between domestic size and product diversification, on the one hand, and the relative volume of foreign sales and production is negative.

The partial effect on exports of foreign production controls will be investigated in Chapter 7. First, we will examine the net effect of foreign production controls on the total exports of the firm and, then, we will examine whether such controls have a differential effect, as expected, on the firm's exports of substitute products (S_{XS}) and complementary products (S_{XC}) respectively.

4.5 List of variables

S_X = parent exports from Sweden.

S_H = parent (consolidated) sales in Sweden.

S_Q = "production abroad for sales abroad". Foreign manufacturing affiliate net sales abroad, i.e., affiliate sales - imports from Swedish parent.

S_X+S_Q = "total sales abroad", i.e., parent exports from Sweden + foreign manufacturing affiliate net foreign sales.

Q_A = "production abroad". Foreign manufacturing affiliate net sales, i.e., affiliate sales - imports from Swedish parent.

Q_H = "production in Sweden". Parent (consolidated) sales.

S_{XS} = S_X-S_{XC} = "substitute" or "non-complementary" exports.

S_{XC} = "complementary" exports. Parent exports to manufacturing affiliates.

S_{Xj} = parent exports from Sweden to country j

S_{Qj} = "production in country j for sales in country j", i.e., manufacturing affiliate gross sales in country j - imports from Swedish parent $(\frac{\text{net sales}}{\text{gross sales}})$, where the weight S_{Qj}/Q_j is necessary to take account of the fact that imports from Swedish parent are also exported from country j.

Q_j = "production in country j", i.e., country j affiliate net sales.

(All the above variables are in thousands of kronor).

Div = Herfindahl's index of product diversification using 6-digit SNI. $0 \leq \text{Div} \geq 1$.

R&D = "R&D intensity". Total company sponsored expenditures for research and development relative to parent sales (Q_H). (%)

LS = "labor skill intensity". Wages and salaries per employee in Sweden (in thousands of kronor).

KL = "capital intensity". Book value of property, plant and equipment per employee of the firm in Sweden (in thousands of kronor).

NR = "natural resource intensity". Dummy variable. NR=1 for the paper and pulp industry and the iron and steel industry.

SC = minimum efficient plant size, measured as average value added per plant in Swedish industry on the 5-digit SNI level, weighted by the relative size of these 5-digit groups in the overall output of companies (in thousands of kronor).

T = tradability, measured as (exports + imports)/consumption in Swedish industry on the 5-digit SITC level, weighted as above. (%)

YR = age of oldest foreign manufacturing affiliate by decade, i.e., 1974 minus year of establishment, using only the first 3-digits; e.g., 197-195 = 2. $0 \leq YR \leq 8$.

$\bar{w}_j/\bar{w}_H$ = average wage of wage workers of manufacturing affiliates in country j relative to that of parent in Sweden. (%)

GDP_j = "country size". Real gross domestic product, 1970.

$GDP\text{-}cap_j$ = "per capita income". Real GDP per capita, 1970.

TU_j = "country tariff policy". Dummy variable. $TU_j = 1$ for EFTA countries, which have no tariffs on imports from Sweden.

Chapter 5

Firm and Country Determinants of Exports and Foreign Production by Swedish Firms

In this chapter we will examine empirically the determinants of the propensities of Swedish firms to sell and to produce abroad. First, we will describe firm, industry and country differences in the international involvement of Swedish firms. Then, we will test hypotheses regarding the determinants of such differences, using regression analysis.

The reason for looking at the propensities of firms to sell and to produce abroad is that firms in different industries are compared. By normalizing the firm's size in foreign markets by its size in the home market we hope to eliminate size differences between firms which are due mainly to industry differences in market size and, thus, get a measure of the competitive position of Swedish firms in foreign markets. The analysis is continued in the next chapter, where we will also investigate the determinants of whether firms produce abroad and of the volume of foreign production.

5.1 Measures of the international involvement of Swedish foreign investors

Swedish manufacturing industry is highly oriented towards foreign markets and Swedish foreign investors are even more so. Swedish firms which had manufacturing affiliates abroad in 1974 accounted for 46 % of manufacturing employment in Sweden, about the same share of value added but 56 % of total manufacturing exports. Adding to this picture net sales by the foreign sales and manufacturing affiliates of these firms, which are almost as large as parent exports, we get a measure both of the international involvement of these firms and of the size of this involvement relative to Swedish manufacturing as a whole.

Only some 110 Swedish companies with manufacturing activities abroad in 1974 are covered by the survey data.[1] However, this small number of firms come close to representing the total population of Swedish foreign investors in the manufacturing industry.[2] Hence, not only are foreign manufacturing activities restricted to a relatively small number of firms but these firms are also, on average, quite large.

Table 5:1 gives a breakdown of the total consolidated sales of Swedish foreign investors in 1974 according to where the output is sold, by whom it is sold and where it is produced. It illustrates, in a rough way, how the variables which we will want to explain are derived as well as their average size. Section 1 of the table shows that foreign sales were 63 % of total sales in 1974 and that little more than half of total foreign sales were exports from Sweden.

Section 2 shows that 41 % of company sales constituted sales by foreign sales and manufacturing affiliates and section 3 reveals that a yet smaller

[1] Swedish foreign manufacturing investors are defined as Swedish manufacturing firms, which are not subsidiaries to a foreign company and which have majority-owned manufacturing affiliates abroad.

[2] The coverage of large and medium sized firms in the survey was virtually complete. The coverage of small firms is faulty, partly because of a somewhat lower response rate among small firms but mainly because they are more likely to have been missed in the original sample. See Appendix B.

Table 5:1 Swedish firms with foreign manufacturing affiliates. Sales and production at home and abroad in 1974

	1974 millions of kronor	% of total sales
Total sales	110 754	100
of which		
1. Sales in		
Sweden	40 979	37
abroad	69 775	63
of which		
exports from Sweden	38 110	34
2. Sales by		
Swedish parent group [a]	65 689	59
foreign affiliated firms [b]	45 065	41
of which		
manufacturing affiliates	31 179	28
sales affiliates	13 886	13
3. Production by		
Swedish parent group [c]	79 089	71
foreign affiliated firms [d]	31 665	29
of which		
manufacturing affiliates	25 830	24
sales affiliates	5 835	5

Affiliates are firms in which the parent (directly or indirectly) holds more than 50 % of the share capital. Manufacturing affiliates are firms for which manufacturing represents at least 10 % of total sales.

[a] Excl. sales to foreign affiliates.

[b] Incl. sales value of goods purchased from Swedish parent.

[c] Swedish parent group consolidated sales including sales to foreign affiliat firms.

[d] Foreign affiliated firms' sales excluding purchases from Swedish parent.

portion, 29 %, was the sales value of foreign output. A portion of the latter is the sales value of output by foreign sales affiliates. This is one aspect of the international involvement of firms that we disregarded in the theoretical discussion and that we will continue to omit in the empirical analysis. Sales affiliates accounted for 5 % of total output, which represents value added in sales, installation and service activities as well as tariff- and transportation costs.

Manufacturing affiliate net sales represents the sales value of foreign output less imports from the Swedish parent group. It, too, includes sales margins on goods resold for the Swedish parent and some installation and service. By comparing manufacturing affiliate gross sales (28 % of total sales) to their net sales (24 % of total sales) we obtain a measure of the extent to which manufacturing affiliates import intermediate and final products from the Swedish parents.

Finally, we can compute from the table that the average propensity to sell abroad, $(S_X + S_Q)/S_H$, for foreign investors as a group was 1.70 and the average propensity to produce abroad, Q_A/Q_H, was .33.

Figure 5:1 shows how the international involvement of Swedish foreign investors has increased steadily since 1965.[1] Foreign sales relative to total sales has increased dramatically (from 52 % to 63 %). The increase has come as much from exports as from foreign production, that is, exports and

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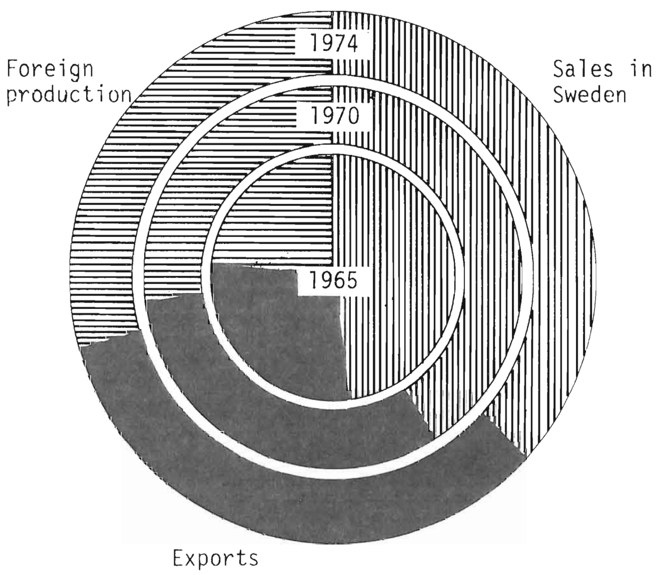
[1]The comparison is based on essentially the same group of firms in each year, since "identical" firms account for 97 % of the total values. The comparison is nevertheless affected by a large merger in the period. The inclusion of the merged firm from 1970 reduces the measured rate of growth of exports and foreign production relative to total growth between 1965-70.

Figure 5:1 Firms with foreign manufacturing affiliates: Sales and production at home and abroad 1965, 1970, and 1974



foreign production have grown at exactly the same rate throughout the period. The slow rate of growth at home relative to abroad indicates that foreign investors, at least as a group, have exhausted home markets and that domestic growth is restrained by the rate of growth of the home market, which is what the sequential growth theory, discussed earlier, would suggest.

Average values of foreign sales and production shares conceal considerable variations among firms, as shown in Tables 5:2 and 5:3, which are based on 1970 values. The distribution of firms with respect to the ratio of foreign relative to total sales is fairly even, with a concentration of firms in the 41-60 % range, i.e., immediately below the average value in 1970 of 60 %. The distribution of firms with respect to the ratio of foreign production relative to total sales shows half of the firms in the lowest bracket, 1-10 % of total sales, and the remaining firms spread out in the range 11-80 % of total sales.

Also, we note in Table 5:2 that the average volume of foreign sales increases as the ratio of foreign to total sales rises. The larger the relative volume of foreign sales, the larger, on average, the absolute volume of foreign sales. The same may be observed with respect to foreign production in Table 5:3. Hence, it appears that the most multinational firms, where the degree of multinationality is measured by the relative size of multinational activities, are also, on average, the ones with the largest foreign operations in absolute terms. In Table 5:3 we see that the 10 most multinational firms - according to this criterion - accounted for half of total manufacturing abroad in 1970.

Table 5:2 Distribution of foreign manufacturing investors in 1970 according to the relative volume of foreign sales

Foreign sales in % of total sales	Number of firms	Foreign sales, millions of kronor	Average foreign sales, millions of kronor	Foreign production in % of foreign sales
0-20	14	171	12	39
21-40	24	2 321	97	23
41-60	31	6 169	199	35
61-80	24	13 376	582	36
81-100	12	9 469	789	60
Total	105	31 506	300	42

For definitions of foreign sales and foreign production, see Table 5:1.
Source: Swedenborg [1973].

Table 5:3 Distribution of foreign manufacturing investors in 1970 according to the relative volume of foreign production

Foreign production in % of total sales	Number of firms	Foreign production, millions of kronor	Average foreign production, millions of kronor
1-10	53	1 399	26
11-20	24	968	40
21-40	18	4 073	226
41-80	10	6 840	684
Total	105	13 280	126

Source: Swedenborg [1973].

5.2 Country and industry differences in affiliate sales and production abroad

Some evidence on the influence of country and industry characteristics on the propensity to sell and to produce abroad can be extracted from the information on foreign affiliate sales and trade shown in Tables 5:4 and 5:5. The tables, which are based on 1970 data, show manufacturing affiliate sales, exports, exports to Sweden and imports from Sweden by region and by industry respectively. The volume of affiliate exports relative to sales gives an indication of the extent to which foreign manufacturing is established to supply the local market. The volume of imports relative to affiliate sales gives an indication of value added in foreign production.

In Table 5:4 we see that - excluding the rather extreme African case accounted for by only a few affiliates - EEC and EFTA affiliates had the highest export shares on average. Only a small portion of exports from the EEC were sold to Sweden (7 %), while as much as 35 % of EFTA exports were for the Swedish market. Within EFTA, affiliates in Portugal had by far the highest export share. The high value is affected by one large pulp producer, but excluding this firm only lowers the export ratio from 85 to 72 %, while exports to Sweden relative to affiliate sales increases from 32 to 77 %. This extreme case is explainable by two factors: low Portuguese wages in combination with free trade with Sweden within EFTA. The clothing industry is an industry for which both of these factors are important.

EEC exports,on the other hand, are probably mainly destined for other EEC-countries, since a prime reason for the establishment of manufacturing by Swedish firms in the Common Market in the 1960's was to get inside the tariff walls. The export share was particularly high in the smaller EEC-countries Belgium and the Netherlands (64 and 32 % respectively).

Table 5:4. Manufacturing affiliate sales, exports and imports by region in 1970 (Millions of kronor)

Region	Sales	Exports	Exports to Sweden	Imports from Swedish parents	In % of sales exports	In % of sales export to Sweden	In % of sales imports from Sweden
Industrial countries	14 153	2 691	387	2 321	19	3	16
EEC	8 134	1 798	126	1 155	22	2	14
EFTA	3 370	676	235	674	20	7	20
of which:							
Nordic countries	1 702	295	138	356	17	8	21
Other Europe	155	13	9	44	8	6	28
North America	1 850	196	14	328	11	1	18
of which:							
United States	1 368	59	6	183	4	0	13
Australia, New Zealand, South Africa	644	8	3	120	1	0	19
Developing countries	1 885	85	10	216	5	1	11
Africa	48	41	7	2	85	15	4
Asia	430	9	1	24	2	0	6
Latin America	1 407	35	2	190	2	0	14
World	16 038	2 776	397	2 677[a]	17	2	17

[a] The total exceeds the sum of the regional figures because it includes an estimated value (140 mill.kr) for one company which was not possible to allocate by region.

Source: Swedenborg [1973].

Manufacturing outside the two European trading blocks seems to have been established primarily with a view to supply the local market, as seen by relatively low export shares.

Regional differences in imports of goods from the Swedish parents for resale or for further processing supply additional evidence on the importance of trade barriers. Such imports were relatively high in the EFTA-countries and in other Europe (30 and 28 % respectively) and relatively low in the EEC (14 %). Both export and import propensities were also relatively low in Latin America and Asia, where, again, the level of protection is often quite high and considerable incentives are offered local producers.

Industry differences in affiliate sales and trade are shown in Table 5:5. Three industries display substantially higher affiliate export shares than the rest: transportation equipment (40 %), paper and pulp (37 %) and textiles and clothing (79 %). Exports by affiliates in the transportation equipment industry are mainly intra-EEC trade. Excepting two large pulp producers in Canada and Portugal, the same is true of the paper industry, which is mainly in the EEC. The clothing industry's high propensity to export, and to export to Sweden (62 % of affiliate sales), illustrates, once more, that this industry has gone international to reduce production costs and to increase its competitiveness in the Swedish market. Judging from the negligible exports to Sweden by other industries, the clothing industry is exceptional in this regard.

The metal manufacturing and the transportation equipment industries have the largest imports from Sweden relative to affiliate sales, almost 40 % in both cases. Imports by affiliates in the metal manufacturing industry were mainly goods for resale, which shows the extent to which the industry relies not only on raw materials but also on basic production in Sweden.

Table 5:5 Manufacturing affiliate sales, exports and imports by industry in 1970

Industry	Millions of kronor: sales	exports	exports to Sweden	imports from Swedish parents	In % of sales: exports	exports to Sweden	imports from Sweden
Food, drink, tobacco	170	12	8	15	7	5	9
Textiles, apparel, leather and leather products	104	82	64	17	79	62	16
Paper and pulp	531	197	15	45	37	3	8
Paper products and printing	526	62	9	59	12	2	11
Chemicals, rubber, plastic products	1 397	131	27	91	9	2	7
Primary and fabricated metals	2 654	282	38	989	11	1	37
Machinery	6 726	1 322	123	591	20	2	9
Electrical machinery	2 131	132	47	368	6	2	17
Transportation equipment	934	369	26	340	40	3	36
Other manufacturing	866	189	41	21	22	5	2
All industries	16 038	2 776	397	2 677[a]	17	2	17

[a] The total exceeds the sum of the industry figures because it includes an estimated value (140 million kr) for one company which was not possible to allocate by industry.

Source: Swedenborg [1973].

The sizeable imports by affiliates in the transportation equipment industry (mostly auto manufacturers), on the other hand, were mainly components for assembly abroad and reveal that value added in foreign manufacturing was still relatively modest in 1970.

5.3 Determinants of the overall propensity to sell and to produce abroad

On the basis of the theory formulated earlier we expect that the differences between Swedish foreign investors in the relative volume of foreign sales and production observed above should be related to differences in firm-specific competitive advantage and in certain industry characteristics affecting the location of production. In addition, they should depend on dynamic-historical factors such as when the firm started growing in foreign markets.

Here we will test these hypotheses using multiple regression analysis on cross-sectional data for Swedish foreign investors in 1974. The dependent variables are the overall propensity to sell abroad, $(S_X+S_Q)/S_H$, and the overall propensity to produce abroad, Q_A/Q_H. The explanatory variables are the firm's R&D intensity (R&D), and the skill level of its labor force (LS), as rather imperfect measures of a firm-specific knowledge advantage, and its capital intensity (KL), natural resource intensity (NR,a dummy), the importance of scale economies (SC) and product tradability (T), as factors expected to affect location, the length of time the firm has produced abroad (YR), to capture the influence of dynamic-historical factors.

The hypothesized influence of the independent variables is not such that it allows us to specify a regression model of a particular form. Regressions have therefore been run in both linear and double logarithmic form. The linear form was rejected because it produced residuals which increased with the predicted value of the dependent variables (a fan shaped residual plot against $\hat{Y}$). The logarithmic form yielded a better fit and is the one used throughout this chapter. Hence, the regression coefficients are elasticities.[1]

Since the regressions include a rather large number of explanatory variables it will aid in interpreting the regression results to take a look at the simple correlation coefficients between all the variables. Table 5:6 shows the simple correlation between the explanatory variables and the dependent variables. Most of the correlation coefficients have the expected sign. R&D intensity and labor skills are positively correlated with all the dependent variables and the location factors are positively correlated with export propensities and negatively correlated with foreign production propensities, as expected. From the strength of

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[1] The two functional forms tried were thus

(1) $Y_i = \beta_1 + \beta_2 x_{2i} + \dots \beta_k x_{ki}$ $\qquad i = 1, 2, \dots n$

and

(2) $Y_i = \beta_1 x_{2i}^{\beta_2} x_{3i}^{\beta_3} \dots x_{ki}^{\beta_k}$

which becomes linear in transformed variables by taking logs on both sides

(2)' $\log_e Y_i = \log_e \beta_1 + \log_e \beta_2 x_{2i} + \dots + \log_e \beta_k x_{ki}$

and where (2)' is the one which fitted the data best.

It should be noted, however, that the regression results were not insensitive to the changed specification. The significance of some variables, though not their sign, changed in the logarithmic formulation. Moreover, the correlation between the independent variables increased and multicollinearity between variables in the regression became more severe.

Table 5:6 Correlation coefficients: overall exports and foreign production propensities and the independent variables[a]

Independent variables	Dependent variables S_X/S_H	S_Q/S_H	$(S_X+S_Q)/S_H$	Q_A/Q_H
RD	0.285	0.419	0.380	0.349
LS	-0.260	0.317	0.339	0.196
KL	0.151	-0.111	0.101	-0.282
NR	0.232	-0.044	0.161	-0.223
SC	0.324	0.099	0.299	-0.134
YR		0.593	0.466	0.580

	Independent variables RD	LS	KL	NR	SC	YR
RD	1.000	0.374	0.028	-0.113	0.096	0.368
LS	0.374	1.000	0.297	0.098	0.211	0.227
KL	0.028	0.297	1.000	0.457	0.500	0.099
NR	-0.113	0.098	0.457	1.000	0.515	-0.042
SC	0.096	0.211	0.500	0.515	1.000	0.348
YR	0.368	0.227	0.099	-0.042	0.348	1.000

[a] The variables are in logarithmic form. 1974 values.

$(S_X+S_Q)/S_H$ = foreign sales/domestic sales
S_X/S_H = exports/domestic sales
S_Q/S_H = affiliate net local sales/domestic sales
Q_A/Q_H = affiliate net sales/domestic sales
R&D = R&D-sales ratio
LS = labor-skill measure
KL = capital-labor ratio
NR = dummy variable for paper and pulp and iron and steel industries
YR = age of foreign manufacturing

the simple correlation, the YR variable appears to be the single most important determinant of inter-firm differences in foreign production propensities.

The lower panel of the table reveals that the independent variables are in some cases highly correlated among themselves. R&D intensity is, not unexpectedly, rather highly correlated with the labor skill measure and also with the YR variable. KL, NR and SC are highly correlated with one another. This, too, is not surprising, since NR is a dummy variable which stands for the iron and steel and paper and pulp industries and these are characterized both by a very high capital intensity and by large scale production.

The product tradability variable (T) is not included in the table. It had the expected effect in the original regressions in arithmetic form, i.e., it was highly significant and positive in the exports regression but was insignificant in the foreign production regression. However, it was omitted from subsequent regressions because it appeared to act as a proxy for the propensity to export, as it was suspected it might in view of the way it was measured (cf. p. 101).

Bivariate plots of the independent variables against the dependent variables indicate that the simple correlation is in some cases affected by a few extreme observations. Figures 5:2-5:3 show two representative scatter diagrams. In Figure 5:2 the dependent variable is the propensity to export, S_X/S_H, and in Figure 5:3 the dependent variable is the propensity to produce abroad, S_Q/S_H. Two extremely low values of S_X/S_H are circled in Figure 5:2 and two extremely low values of S_Q/S_H are circled in Figure 5: These extreme observations refer to four different firms but the same four firms tend to enhance the positive relationship between all the different

Figure 5:2 Scatter diagram of the propensity to export against R&D intensity (logarithmic values)

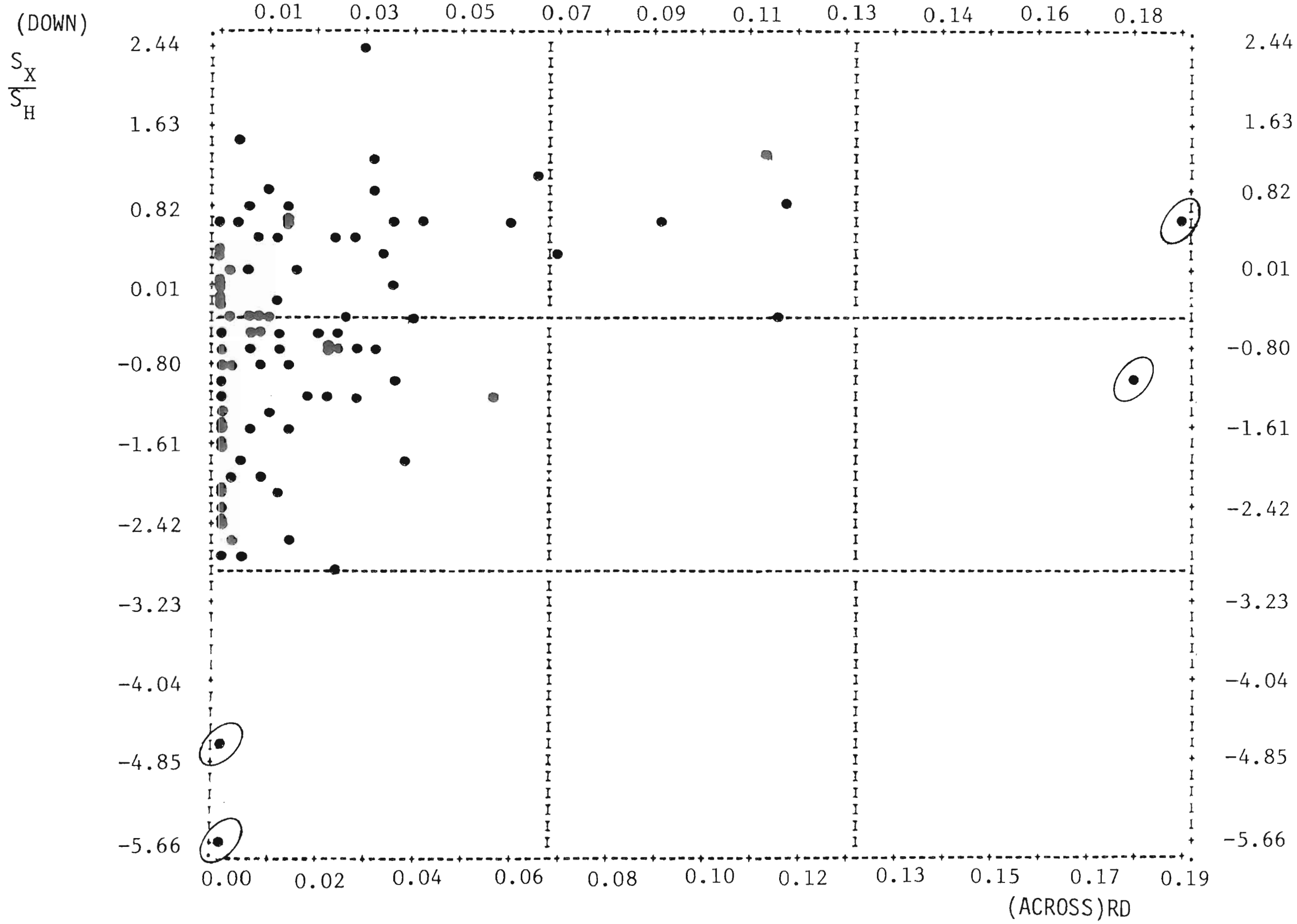


Figure 5:3 Scatter diagram of the propensity to produce abroad against skill intensity (logarithmic values)

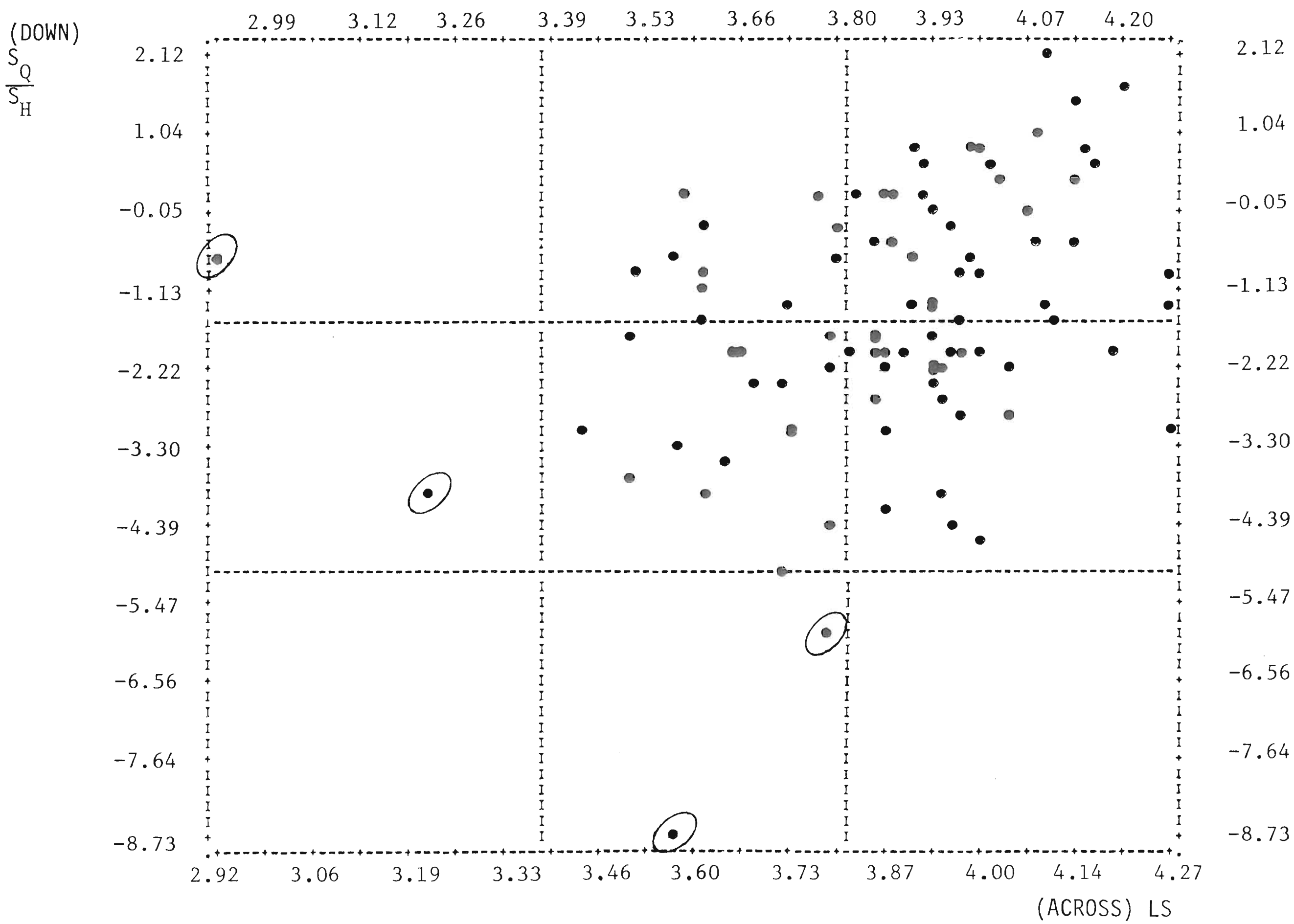
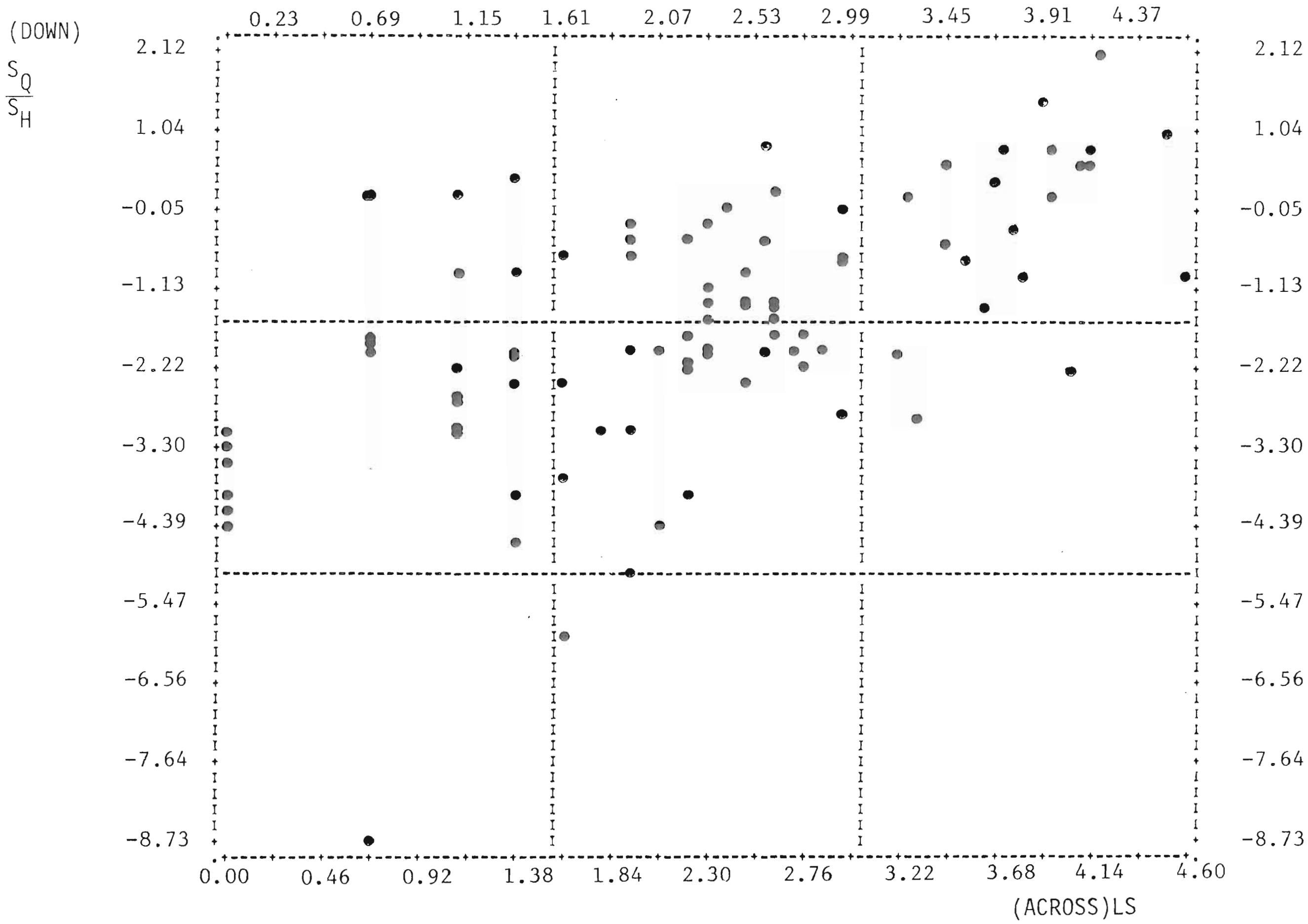


Figure 5:4 Scatter diagram of the propensity to produce abroad against the age of foreign manufacturing (logarithmic values)



independent variables and these dependent variables. The firms are alike in that they are relatively small and that three of them are in the clothing industry, which is generally characterized by a low propensity to export and which, furthermore, exports most of its foreign output to Sweden (making S_Q/S_H low but, we may note, does not affect Q_A/Q_H).

Similarly, we observe some rather extreme values of the independent variables in the scatter. The highest values of R&D intensity in Figure 5:2 refer to two pharmaceutical firms, the only "pure" pharmaceutical firms in the sample. The lowest values of skill intensity in Figure 5:3 again refer to two firms in the clothing industry. In neither case is it surprising that firms in these industries should account for the extreme observations.

Figure 5:4, finally, shows the most distinct relationship among the plotted variables, namely, between the age of foreign manufacturing, YR, and S_Q/S_H. We note the same two extremely low values of S_Q/S_H as in Figure 5:3, affecting, but not unduly changing, the relationship.

I have chosen not to experiment by omitting extreme observations (a total of 9 firms) or "correcting" possible errors in the measured variables, since the same or similar errors are likely to be present with respect to the other variables and since these firms cannot be singled out as irrelevant. Also, in the next section, we will see that the results are not changed much when small firms, like the extreme ones here, are accorded less weight in the analysis.

The bivariate plots reflect the rather low simple correlation between some variables. With the exception of the YR variable and, perhaps, R&D and LS, no single variable appears capable of explaining but a small part of the variation in the foreign involvement of these firms.[1]

But how significant is each variable when we allow for the simultaneous influence of all explanatory variables and what is their combined explanatory power? The regressions shown in Table 5:7 give the answer.

The rather high correlation between some of the explanatory variables means that not each variable is significant when the others are in the regression. Still, the results in Table 5:7 consistently bear out the hypothesized relationships. Thus, the positive influence of R&D and skill intensity, singly or jointly, on the relative size of foreign sales and production conforms to our hypothesis that the competitive advantage of firms is related to knowledge advantage. Whether these variables, in fact, reflect a firm-specific advantage, is impossible to say. An alternative interpretation is that accumulated know-how, not measured, is especially large in skill intensive activities because of Sweden's comparative advantage in such production. This would be in line with our finding in Chapter 3, where we argued that the industry pattern of direct investment was related to the investing country's comparative advantage.

The differential impact of capital intensity, of the natural resource variable and of average plant size on export and foreign production propensities indicates that these factors affect the location of production in the way suggested by international trade and location theory. The remarkably strong influence of the age of foreign manufacturing on the relative volume of foreign production, finally, underlines the danger of

[1] $\bar{R}^2$ with only one independent variable in the regression ranged between .11 and .33 when S_Q/S_H was the dependent variable and LS, R&D or YR was the independent variable. The explanatory value of the variables in the exports case was lower.

Table 5:7 Determinants of the propensity to sell and to produce abroad. All firms (1974)

		Independent variables								
Dep.var.	Const.	R&D	LS	KL	NR	SC	YR	DF	$\bar{R}^2$	F
$(S_X+S_Q)/S_H$	-4.35	7.22**	.96*	-.15	1.06**	NI	.38***	87	.30	8.77***
		(2.02)	(1.82)	(1.06)	(2.27)		(3.85)			
S_X/S_H	-5.43	9.00**	.69	NI	.73	.20*		91	.16	5.65***
		(2.38)	(1.20)		(1.29)	(1.76)				
S_Q/S_H	-7.84	8.82*	1.62**	-.54***	.68	NI	.78***	85	.44	14.96***
		(1.89)	(2.30)	(2.95)	(1.13)		(5.99)			
Q_A/Q_H	-3.35	3.35	1.04**	-.40***	NI	-.27***	.72***	88	.53	21.65***
		(1.05)	(2.26)	(3.24)		(3.04)	(7.69)			

Definitions of variables are given in Table 5:6.

NI = Not included in the regressions shown because t < 1.

The numbers in parentheses are t-statistics. *, **, *** indicate significance at the .10, .05 and .01 level respectively. $\bar{R}^2$ is corrected for degrees of freedom (DF).

overlooking dynamic-historical factors, as tends to be done in cross-sectional analysis.

The explanatory power of several of the equations is surprisingly high for cross-sectional analysis, especially since it is based on individual firm data where so many, often unique factors come into play and increase variance. It is also high considering the crude empirical magnitudes with which we work and the many factors affecting the location of production - such as tariffs, transportation costs, government regulation requiring production close to the market - which have not been allowed for in the analysis.

Many questions remain to be analyzed, however. For example, how do country characteristics affect the relative volume of foreign sales and production? What is behind the role played by age in determining the relative size of foreign production? And what determines the point at which firms go abroad? We will start by seeing what may be learned by disaggregating the foreign sales and production of firms by country.

5.4 Determinants of the propensity to sell and to produce in different countries

An analysis across both firms and countries extends the foregoing analysis mainly by showing what characteristics of foreign countries affect the relative volume of foreign sales and production by Swedish firms. Especially the factors affecting the locational choice of firms are more readily analyzed on a country-by-country basis.

The choice between exports and foreign production in serving foreign markets, we have said, depends on relative production costs at home and abroad, primarily on the cost of relatively immobile labor resources. It also depends on the country's trade policy and on whether the foreign market is large enough to allow the firm to exploit scale economies in production.

In comparing Swedish firms' sales and production in different countries we introduce the following new variables. Real gross domestic product (GDP) is used as a measure of market size. Real GDP per capita is intended as a market characteristic and as such would show whether Swedish products are demanded especially in high income markets. But since per capita income differences are likely to be correlated with wage and productivity differences between countries it may equally well serve as a factor affecting the location of production.[1] A dummy variable (TU) identifying membership in EFTA, of which Sweden is a member, is used as a proxy for the influence of tariff policy. TU shows the absence of tariffs on Swedish exports.[2] The average wage of wage workers in the firm's foreign manufacturing subsidiaries relative to that at home ($\bar{w}_j/\bar{w}_H$) will show the role of wage differentials. It does not necessarily show the effect of differences in the cost of labor, since wage labor is not a homogeneous input and wage differentials, therefore, may correspond to productivity differences between countries. Our tentative hypothesis is nevertheless that there should be a negative relationship between the ratio of foreign to domestic wages and the propensity to produce in a particular country.

Besides the above country characteristics, the same characteristics

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1 For example, the same variable is used as a labor cost measure by Lipsey, Kravis and Roldan [1978].

2 EFTA is here defined to include its original members and associates, namely, aside from Sweden, Great Britain, Denmark, Norway, Finland, Austria, Switzerland and Portugal. The fact that Britain and Denmark in 1974 had left and become members of an enlarged EEC has, therefore, been assumed not to have affected the locational pattern in that year.

are used to differentiate among firms in the cross-sections across countries as were used in the overall regressions. We do not, in general, expect these variables to perform differently in the combined firm and country regressions.

Thus, the dependent variables in the pooled company and country regressions are sales and production in individual countries relative to sales or production in Sweden.[1] Of the independent variables firm characteristics (except YR) vary across parent companies only, while country characteristics (except w_j/w_H) vary across countries only. Only two independent variables, YR and w_j/w_H vary across both firms and countries. A consequence of this asymmetry between the dependent and independent variables is that firms which produce in several countries are accorded more weight than firms which produce in only one or a few. (The characteristics of the former are included relatively more often in each regression.) Since the number of countries in which firms produce is correlated with the absolute size of foreign manufacturing, it also means that firms with large foreign operations are given more weight. This should be borne in mind in making comparisons with the results shown in Table 5:7.

Table 5:8 shows the simple correlation coefficients between all the variables in the pooled firm and country regressions. The correlation between the firm and industry characteristics and the dependent variables is even lower than before. The reason is that the variability in the dependent variables has been increased without a corresponding increase in the variability of these explanatory variables. With one exception, the correlation between S_X/S_H and R&D, the coefficients have retained their expected signs.

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[1] If a company has more than one manufacturing affiliate in the same country these have been summed and treated as one observation.

Table 5:8 Correlation coefficients: propensities to export to and produce in different countries and the independent variables [a]

	S_X/S_H	S_Q/S_H	$(S_X+S_Q)/S_H$	Q_A/Q_H
RD	-0.003	0.140	0.096	0.030
LS	0.107	0.225	0.162	0.021
KL	0.120	-0.050	0.033	-0.218
NR	0.260	-0.014	0.105	-0.137
SC	0.168	-0.123	-0.026	-0.328
YR		0.354	0.222	0.298
GDP	0.187	0.214	0.256	0.106
$GDP_{cap.}$	0.269	-0.009	0.161	0.054
TU	0.169	-0.150	0.005	-0.023
w_j/w_H	0.138	0.103		0.124

	RD	LS	KL	NR	SC
RD	1.000	0.422	-0.012	-0.152	-0.053
LS	0.422	1.000	0.099	-0.075	-0.013
KL	-0.012	0.099	1.000	0.475	0.504
NR	-0.152	-0.075	0.475	1.000	0.538
SC	-0.053	-0.013	0.504	0.538	1.000
GDP	0.067	0.081	0.077	0.006	0.063
$GDP_{cap.}$	-0.037	0.025	0.131	0.004	-0.059
TU	-0.112	-0.138	-0.020	0.037	-0.167
w_j/w_H	0.020	-0.078	0.173	0.007	-0.037
YR	0.234	0.155	-0.038	-0.089	0.067

cont.

cont. (Table 5:8)

	GDP	$GDP_{cap.}$	TU	w_j/w_H	YR
RD	0.068	-0.037	-0.112	0.020	0.234
LS	0.081	0.025	-0.138	-0.078	0.155
KL	0.077	0.131	-0.020	0.173	-0.038
NR	0.006	0.004	0.037	0.007	-0.089
SC	0.063	-0.059	-0.167	-0.037	0.067
GDP	1.000	0.122	-0.550	0.025	0.029
$GDP_{cap.}$	0.122	1.000	0.205	0.649	-0.121
TU	-0.550	0.205	1.000	0.096	-0.105
w_j/w_H	0.025	0.649	0.096	1.000	0.013
YR	0.029	-0.121	-0.105	0.013	1.000

[a] The variables are in logarithmic form. 1974 values.

The dependent variables are the propensities to sell and to produce in different countries. The following are also country variables:

GDP = gross domestic product
$GDP_{cap.}$ = income per capita
TU = EFTA membership
w_j/w_H = ratio of foreign to domestic wages
YR = age of foreign manufacturing in country j

Definitions of the other variables are given under Table 5:6, p. 122.

The correlation between the country variables is not very strong either, but all but two of the correlation coefficients have the expected sign. The exceptions are the correlations between S_Q/S_H and GDP per capita and relative wages respectively.

With respect to the correlation among the explanatory variables the high negative correlation between market size and EFTA-membership is conspicious as is the high positive correlation between GDP per capita and relative wages. Neither of these is surprising.[1]

The results are much improved when we allow for the combined influence of the independent variables on the relative volume of foreign sales and production in different countries. In Table 5:9, which shows the pooled company and country regressions, most of the estimated coefficients are significant and the explanatory power of the regressions varies between .19 and .25. The $\bar{R}^2$:s are lower than in the earlier company regressions, however, for the reason noted above.

As for the determinants of inter-firm differences in foreign sales and production we find that the results in Table 5:9 are broadly consistent with our earlier ones. But there are some differences. Although skill intensity continues to have a strong and positive effect, R&D intensity has become insignificant. The natural resource dummy has become significantly positive in both the exports and foreign production regressions. Its positive effects on foreign

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[1] Bivariate plots again reveal that no single variable can explain much of the variation in the dependent variables. Once more, the only exception is the YR variable, which in a simple regression explains 11 % of inter-firm differences in the relative volume of foreign production in different countries. Given the large number of observations, 300-500 in the bivariate plots, estimated coefficients are not as sensitive to a few extreme outliers as in the earlier firm data.

(The number of observations is larger in the bivariate plots than in the multiple regressions to be reported, because the latter exclude observations for which values of some of the independent variables are missing.)

Table 5:9 Determinants of the propensity to export to and produce in individual foreign countries (1974)

Dep. var.	Const.	Independent variables R&D	LS	KL	NR	SC	GDP	GDP/cap.	TU	$\bar{w}_j\bar{w}_H$	YR	DF	$\bar{R}^2$	F
$(S_X+S_Q)/S_H$	-10.79	NI	1.12***	-.14	1.07***	-.13*	.29***	.28**	.70***		.51***	298	.19	9.96***
			(2.87)	(1.21)	(3.42)	(1.74)	(5.10)	(2.18)	(2.78)		(4.82)			
S_X/S_H	-18.80	NI	2.02***	-.34**	1.37***	.24**	.39***	.35*	1.77***	.20		270	.25	12.44***
			(3.43)	(2.09)	(3.66)	(2.52)	(5.38)	(1.73)	(5.53)	(1.15)				
S_Q/S_H	-4.53	NI	2.18***	NI	1.03***	-.39**	.26***	-.41*	NI	.48***	.91***	292	.23	14.09***
			(3.52)		(2.59)	(3.98)	(4.20)	(1.95)		(2.72)	(6.27)			
Q_A/Q_H	.92	1.99	NI	-.27*	.78**	-.51***	.14***	NI	NI	.29**	.81***	292	.24	14.82***
		(1.12)		(1.84)	(2.19)	(5.89)	(2.65)			(2.54)	(6.52)			

Definitions of variables are given in Tables 5:6 and 5:8.

NI = Not included in the regressions shown because t < 1.

The numbers in parentheses are t-statistics. *, **, *** indicate significance at the .10, .05 and .01 level respectively. $\bar{R}^2$ is corrected for degrees of freedom (DF).

production propensities depends on both KL and SC being in the regression, however. Physical capital intensity and plant size still have the expected negative effect on the propensity to produce abroad.

The altered influence of R&D intensity in Table 5:9 compared to in Table 5:7 is not only inconsistent with our hypothesis but it is puzzling as well. It must - for the reasons noted above - reflect a difference between firms which have a large number of foreign subsidiaries and those which have relatively few. Hence, the result suggests that R&D intensity does not explain the foreign involvement of the large foreign investors as well as that of the smaller investors. Instead, the competitive advantage of the former is more strongly related to skill intensity. Furthermore, this appears to be the only important difference between the large and small investors.

The age of foreign manufacturing, YR, now refers to the age of each firm's oldest subsidiary in each country. It still has a highly significant and positive effect on foreign production propensities and shows that firms which have been producing for a longer time in a country have relatively larger production in that country.

Of the country characteristics included, GDP, the market size variable, has a consistently positive effect in all the regressions. As expected, it is most significant in explaining the propensity to sell in different countries, but it also has a positive effect on the propensity to produce. The latter indicates that market proximity influences the location of production, thus reflecting the role of distance related costs and, perhaps, tariffs.

EFTA membership (TU) has a positive effect on export propensities, as expected, and is highly significant.[1] Despite its strong differential effect on the propensity to supply foreign markets through exports and foreign production respectively, it is insignificant in the regression for the propensity to produce abroad (Q_A/Q_H).

Of course, EFTA membership is a crude proxy for country trade policy and cannot be expected to capture the influence of trade barriers very well. At the same time it is more than just a proxy for trade policy, which helps account for its strong influence on exports. EFTA (as defined here) includes among its members (and associates) all the Nordic countries with which Sweden has traditional and strong commercial ties. TU also captures this influence. It is possible that as a proxy for trade policy the variable would have had a negative impact on foreign production propensities, while as a proxy for the influence of cultural and political ties it would have had a positive impact (cf. Ch.3). Then, its insignificance in the foreign production regressions could be due to the cancelling effect of these opposite influences.

The influence of GDP per capita and relative wages is intriguing. The ratio of foreign to domestic wages turns out to be significantly positive in both the regressions for the propensity to produce abroad, contrary to our tentative hypothesis, but is insignificant in the regression for the propensity to export. GDP per capita, on the other hand, has a positive effect on exports and a negative effect on foreign production (or is insignificant as in the regression on Q_A/Q_H).

Given the high degree of multicollinearity between these variables it is difficult to interpret their differential impact when both are in the regression. It is clear, however, that each singly has a positive effect on

[1] That the creation of the EEC and EFTA has had a significant effect on Swedish trade pattern was shown by Lundberg [1976].

the relative volume of foreign sales and production.

It is possible that the influence of country characteristics, and the role of relative wages in particular, would be clarified if there were less variation in the composition of parent firms included in each country. With a smaller number of parent firms country characteristics should come out more strongly and the wage variables should reflect country differences to a relatively larger extent than firm differences. Thus, in Table 5:10 the same regressions are shown for the smaller group of firms (19 firms) which have affiliates in six or more countries.

Looking first at $\bar{w}_j/\bar{w}_H$ and GDP per capita, we find that the positive influence of the former is now even stronger. It has a much stronger effect on both the propensity to export and to produce abroad than does GDP per capita. (Relative wages would have been strongly positive and GDP per capita negative in the regression on $(S_X+S_Q)/S_H$ if the former had been in that regression.) The partial effect of GDP per capita, though still not highly significant, is again negative.

Hence, the results indicate that Swedish firms tend to both sell to and produce in high income countries. They show unambiguously that Swedish firms, in general, do not have a tendency to produce in low-wage countries. Apparently, firms in, e.g., the clothing industry, which clearly have been motivated by lower foreign wages in establishing production abroad, are not representative. Instead, to most Swedish firms locating production abroad high foreign wages seem to be more than compensated for by other factors characteristic of high income countries. Presumably, one such factor is a high productivity of labor. But it may also be the economic infrastructure in such countries and, on the demand side, the sophisticated markets of high income countries for manufactured products. The positive influence

Table 5:10 Determinants of the propensity to export to and produce in individual foreign countries: firms with more than 5 manufacturing affiliates abroad (1974)

Dep. var.	Const.	R&D	LS	KL	NR	SC	GDP	GDP/cap.	TU	$\bar{w}_j.\bar{w}_H$	YR	DF	$\bar{R}^2$	F
		Independent variables												
$(S_X+S_Q)/S_H$	-23.10	NI	4.00***	-1.12***	1.17***	.32***	.23***	.26**	.64**		.68**	170	.35	13.17***
			(5.85)	(4.88)	(3.18)	(3.32)	(3.66)	(2.15)	(2.22)		(5.89)			
S_X/S_H	-30.45	-2.57	5.72***	-1.69***	1.91***	.60***	.34***	NI	2.09***	.83***		162	.38	14.03***
		(1.03)	(5.71)	(5.29)	(3.82)	(4.51)	(4.14)		(5.53)	(4.73)				
S_Q/S_H	-22.58	NI	5.45***	-1.14***	1.02*	.25*	.27***	-.62**	NI	.78***	1.21***	174	.44	13.86***
			(5.67)	(3.70)	(1.94)	(1.84)	(3.95)	(2.41)		(3.02)	(7.46)			
Q_A/Q_H	-14.48	NI	2.91***	-.59**	NI	NI	.22***	-.25	NI	.56**	1.13***	175	.41	22.40***
			(3.70)	(2.54)			(3.69)	(1.12)		(2.48)	(7.87)			

Definitions of variables are given in Tables 5:6 and 5:8.

NI = Not included in the regressions shown because t < 1.

The numbers in parentheses are t-statistics. *, **, *** indicate significance at the .10, .05 and .01 level respectively. $\bar{R}^2$ is corrected for degrees of freedom (DF).

of GDP per capita, like that of GDP, then reflects the importance of market proximity for the location of production.

To the extent that wage differences between firms and between countries mainly reflect differences in the productivity of labor, the results show firms producing relatively more in countries where the skill level is more similar to that of Sweden. Such a finding, though perhaps superficially counter-intuitive, is consistent with the theory in Chapter 2, according to which the knowledge advantage of foreign investors is related to the technology developed and used in the home country, which is adapted to home country factor prices (current or recent). The corollary was that firms will tend to produce in countries characterized by factor prices similar to those of the home country. (Cf. p. 22).

Otherwise the most noteworthy result in Table 5:10 is that confining the analysis to the larger - and perhaps less transient - investors has led to much improved explanatory power of the regressions. The regression equations explain 35-44 % of the variation in foreign sales and production among the larger foreign investors.

In sum, the analysis across both firms and countries has confirmed several of our earlier conclusions. High labor skills positively affect the propensity to produce abroad, which we would expect if the competitive advantage of Swedish foreign investors is based on skilled labor intensity. A high capital intensity does not make for a high propensity to export from Sweden but does have the expected negative effect on the propensity to produce abroad. The latter is consistent with the hypothesis that labor intensive firms have a high propensity to locate production abroad in order to take advantage of lower wages.

However, since the country regressions show that <u>high</u> foreign wages have a positive effect on the propensity to produce in a particular country, the interpretation of the influence of labor intensity on location must be modified. An alternative explanation is that Swedish foreign investors, on average, are characterized by intensive use of skilled labor relative to capital and that this affects their locational choice in such a way that they produce more in countries where the skill level is more similar to that in Sweden, as shown by a relatively high wage level in these countries.

Large scale production implies a high propensity to export and a low propensity to produce abroad. The Swedish resource based industries (iron and steel and paper and pulp) have an especially high propensity to export but they also have relatively large foreign production. The latter need not contradict the hypothesis that the availability of natural resources affects location, since foreign production by firms in these industries is often in stages of manufacturing which are relatively far removed from the resource end.

The results of the pooled firm and country cross-sections differ, however, from the earlier company cross-sections in suggesting that the large Swedish foreign investors do not have a competitive advantage based on R&D intensity. To be reconcilable, it should be true that firms which have a high level of foreign involvement relative to their size, but have relatively few foreign affiliates, have a relatively high R&D intensity. It is far from obvious why this should be so.

In the next chapter we will examine whether this is a difference between the old, established multinational firms and the recent entrants to the multinational arena. A tentative explanation for such a difference is the following. Innovative firms may be more geared towards selling in the home market, at least in the initial stages of product or process development. Then, to the extent that, at that stage, actual manufacturing is rather more integrated with the firm's research, which is located at home, they will choose to supply foreign markets through exports. They can do so, because in selling in foreign markets their competitive advantage is foremost a unique product, not a lower price of that product. This explanation is in line with the theory of the product cycle described in Chapter 2.

5.5 The effect of wage differentials on the locational choice of individual firms: additional evidence

The above finding that low foreign wages are not an incentive to locate production abroad is consistent with the contention of representatives of some large Swedish multinational firms. (Meyersson, 1976.) They claim that labor productivity in Sweden is high enough - due to higher capital intensity and larger scale production - to justify the higher Swedish wages. Yet, in comparing labor productivity and wage rates Meyersson (ibid) finds in case studies of three large Swedish multinational firms that differences in labor productivity between their foreign affiliates do not fully compensate for differences in relative wages.[1] For these firms wage differences among countries partly reflected differences in the cost of labor, which - in the absence of offsetting influences - should mean a high propensity to produce in these countries.

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[1] The companies analyzed were Sandvik Steel, L.M. Ericsson (telephone stations and equipment) and SKF (roller bearings). Many of the foreign affiliates of the latter use the same technique and factor intensity and operate on a similar scale as SKF, Sweden. Meyersson's figures indicate that these affiliates have lower average cost per unit of output than the parent company in Sweden. This is difficult to reconcile with the relatively large exports of SKF,Sweden, however. The export share of the parent company (around 70 per cent) is much higher than that of any of its foreign affiliates.

Since the results regarding the effect of wage differentials on the location of production presented in Tables 5:9 and 5:10 did not conform to a priori expectations, nor to the partial evidence presented by Meyersson, further analysis of this issue is called for. The question merits careful attention also because it is one that commands considerable political interest. That is, if the rapid growth of Swedish industry outside Sweden has been motivated by a too rapid rise in Swedish wages compared to in the outside world, domestic economic policy could do something about it.

To check the validity of our results a number of cross-country regressions were run for single firms. By holding parent company constant the influence of country characteristics, including relative wages, on location was isolated. A number of different specifications were tried. The dependent variable was the propensity to produce in individual countries, or changes in that propensity between 1965-74 and 1970-74. The independent variable was relative wages (affiliate relative to parent wages), or changes in relative wages, singly or in combination with other country characteristics. The analysis involved only the largest foreign investors, some 10 firms with affiliates in 10 or more countries.

The combined result of all the runs gave broad support to the earlier findings. Relative wages or GDP per capita, which is highly correlated with relative wages, especially when parent company is held constant, were not always significant but when they were, one of them was always positive and the positive coefficient was always the most significant one. When the same specification was used as in Tables 5:9 and 5:10 relative wages or GDP per capita was significant in only six out of 10 regressions. Thus, either relative wages has had no detectable influence on the location of production or the relationship has been positive.

Thus, the evidence again shows that the relative volume of foreign production in particular countries is not motivated by lower foreign wages. Low foreign wages must therefore be more than offset by other factors in high income (or high wage) countries.

5.6 A comparison with some related studies

Although the theory of international production is increasingly couched in terms of the theory of the firm, the hypotheses examined here have not been tested on individual firm data before. There have, however, been a number of studies based on, mainly industry data for the U.S., which are similar in scope and intent. Those that seem of particular relevance here are two studies by Horst [1972] and [1974], one by Caves [1974] and one by Samuelsson [1977]. The study by Samuelsson uses industry data on foreign investment in Sweden. In each of these studies regression analysis on industry cross-sections is used to determine the nature of the competitive advantage of multinational firms.

In his 1972 study Horst, on the basis of cross-sectional data for some 20 industries, was able to explain the Canadian market shares of U.S. industries by industry differences in R&D intensity. The total U.S. share of the market was shown to depend on inter-industry differences in R&D intensity, while the choice between the two sources of supply was explainable by inter-industry differences in tariffs and a (crude) proxy for comparative production costs. Horst's study is both theoretically and empirically neat, but it seems likely that the crude industry classification used contributed to the strong empirical results regarding the role of R&D intensity. This variable is not as important in the comparable analysis of Caves reported on below.[1]

Caves (ibid) looked at the production shares of all foreign owned firms in 64 Canadian manufacturing industries and found support for his hypothesis that the competitive advantage of multinational firms depends on their possession of "intangible capital" and, his corollary proposition, on the absolute size of firms.[2] The most important kind of intangible capital was, again, related to R&D intensity. To identify the role of absolute size Caves used the share of large firms in the industry and various measures of plant size assumed to reflect barriers to entry. The dominance of multiplant firms was also treated as an entry barrier. The latter, which was highly correlated with concentration, turned out to be the most significant explanatory variable, while plant size was usually insignificant. (All the independent variables were derived from U.S. industry data.)

A main "rival" hypothesis formulated by Caves was that foreign investment was explainable by firm-specific (entrepreneurial) skills, i.e., a variant of our own main hypothesis. He tested this by various measures of each industry's skill intensity. Although the skill variables, in separate regressions, were nearly as significant as R&D intensity, and more significant than the other "intangible capital" variable advertising intensity, Caves nevertheless concludes that a hypothesis based on a skill advantage "gets no

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[1] The difference in results between the two studies is not due to the different measures of market shares, since Horst looked at both the share of the Canadian market supplied through U.S. exports and through U.S. production in Canada as well as the combined share.

[2] Cf. the discussion of the "oligopoly-theory" of foreign investment in Chapter 2.

real support."(Ibid, p. 286.) In the same studies both Horst and Caves repeat the analysis on U.K. industry data and obtain broad confirmation of the Canadian results.

Caves' dismissal of his "rival" hypothesis is questionable on the basis of the results he presents. But more than that, one may question whether an advantage based on human capital intensity is necessarily different from one based on R&D and advertising intensity. Either one may be expected to be related to the creation of "intangible capital". In any case, his conclusion regarding the role of skill intensity in explaining U.S. foreign investment is not borne out for Swedish foreign investors.

The positive relationship between the dominance of multiplant firms in an industry and the share of the U.S. industry in Canadian manufacturing says more, one would think, about industry characteristics affecting location than it does about the nature of the industry's competitive advantage. We will return to the question of the relationship between firm size and foreign manufacturing in the next chapter, however.

Samuelsson, in his study of foreign manufacturing investment in Sweden, relates the production shares of foreign owned firms in 120 industries to Swedish industry characteristics. He finds that the competitive advantage of foreign owned firms in Sweden depended positively on technical personnel intensity and advertising intensity, both intended as measures of a know-how advantage and both highly significant, and, less decisively, on physical capital intensity. The presence of large Swedish multinational firms in an industry, represented by a dummy, had a negative effect on the relative size of the foreign presence.

The results broadly held up also when U.S. and European owned firms were analyzed separately, which Samuelsson takes as support for his hypothesis that the competitive advantage of foreign investors is independent of their nationality. This conclusion is correct if the competitive advantage of multinational firms is defined in general terms as superior know-how. It is not true in the sense that multinational firms of different nationalities tend to have a competitive or know-how advantage in the same activities.

Thus, U.S. owned firms in Sweden accounted for large shares of industries characterized by a high technical personnel intensity, a high capital intensity and a high export share, while European owned firms were relatively large in industries characterized foremost by a high advertising intensity. Since a high advertising intensity especially characterizes consumer goods industries, these differences indicate that U.S. firms are concentrated in producer goods industries while European firms to a larger extent are found in consumer good industries.

Also, there was a significant negative relationship between U.S. and European shares of an industry as there was between each of them and the presence of Swedish multinational firms. The different specialization patterns of multinational firms of different national origin, which is evident in Samuelsson's results, is consistent with our conjectures in Chapter 2 and the evidence in Chapter 3. That is, the competitive advantage of foreign investors in different countries is not distributed similarly by industry but is related to the comparative advantage of the investing country.

Foreign firms preferred production in Sweden in industries where Sweden may be assumed to have a comparative advantage, namely, in skill intensive and capital intensive activities. Skill intensity (measured, as we also have, by wages per worker) was by far the most significant factor affecting the choice between production in and exports to Sweden.

It is interesting to note that production by U.S. firms in Sweden appeared to be determined by Sweden's comparative advantage in skill intensive production, while production by European firms appeared motivated by trade barriers. This was also reflected in differences in export propensities between the two groups of firms. The average export share of U.S. affiliates was 63 per cent and that of European affiliates was 23 per cent.

The other study by Horst [1974] is more readily comparable with our own in that it uses industry exports and foreign production propensities instead of foreign market shares as dependent variables. Pooling cross-sectional data for 23 industries and 8 countries Horst examines the determinants of industry exports and foreign production, normalized by each industry's sales in the U.S. He finds that R&D intensity and the asset value of the median plant size, intended to capture a U.S. advantage in industries where capital requirements run high, are quite significant in the exports case but insignificant or nearly so (plant size) in the foreign production case.

Among the country characteristics GNP, as a measure of market size, and the share of U.S. exports in a country's total imports, a measure of "traditional commercial ties", have a strong positive effect on both exports and foreign production. A third country variable, consumption per capita, was expected to take account of the fact that U.S. goods were particularly suited to high income countries.

Horst does not make much of his results which, he said, were only a preliminary to an analysis of the effects of foreign production on exports.

They deserve more attention here because of certain similarities with our own findings for Swedish firms. Thus, although Horst's analysis reconfirms that R&D intensity positively affects U.S. exports by industry, he shows that it has no effect on the propensity to produce abroad. This result lends support to our tentative explanation for a negative relationship between R&D intensity and foreign production by Swedish firms. Further support is given by Cohen _et al._ [1975], who find a negative relationship between innovativeness and foreign production in their study of firms in the pharmaceutical industry. Cohen _et al._ conjecture "that innovative firms are more able to serve/...../foreign markets via exporting from the U.S. or via licensing ". Lipsey and Weiss [1976a] report a similar result but in their study the differential impact of R&D intensity and exports and foreign production by the pharmaceutical industry is weak. Taken together, however, these findings do not support the prevalent idea that R&D intensive firms and industries tend to produce relatively more abroad.

The second interesting similarity between Horst's results and our own is the strong positive effect of consumption per capita in the production regression (by far the most significant variable with t=6.07) and its insignificance in the exports regression (t=.97). This matches the showing of GDP per capita in Table 5:10 and the interpretation given to it there, namely, that firms tend to locate production in countries where the income or wage level is more similar to that in the home country, partly because of the higher skill level of labor.

5.7 Summary and conclusions

There is a consensus based on the results of several studies on the general characteristics which are conducive to multinational activity. Foreign investors are characterized by a "knowledge advantage" based on a high R&D, advertising or skilled labor intensity. Furthermore, foreign production tends to replace exports when production costs abroad are favorable and barriers to trade are high.

My own results so far are broadly consistent with the ones obtained in the studies referred to above. They diverge mainly in suggesting that the competitive advantage of Swedish foreign investors is related to skill intensive activities, while a high R&D intensity seems to bias firms towards exporting and against producing abroad. This may, or may not, be a difference between Swedish and U.S. foreign investors. If it is a difference, it reaffirms the contention in Chapter 3 that the (firm-specific) competitive advantage of foreign investors is related to the comparative advantage of their home country, since the U.S. is commonly held to have a comparative advantage in R&D intensive production and Sweden in skill intensive production.

The results also show that industry characteristics such as capital intensity, the existence of scale economies in production, and, to some extent, the availability of natural resources affect the location of production, as predicted by theory. Unexpectedly, however, they reveal that Swedish firms tend to produce relatively more in countries with high wages than in countries with low wages. I interpret this as showing that wage differentials in large part reflect productivity differences among countries and that Swedish firms tend to produce more in countries where the productivity, or skill level, of labor is similar to that in Sweden. In addition, I interpret it to show that Swedish firms tend to produce where the market is, i.e., in large, high income countries. Indirectly, then, the positive influence of market size and income per capita (or relative wages) on the propensity to produce abroad reflects the importance of market proximity on the location of production, where "market proximity" is a euphemism for the numerous barriers to trade which exist but are difficult to bring together under one heading and impossible to quantify.

A chief contribution of the analysis in this chapter is that it bears out some hypotheses for the outward investment of a country other than the U.S. and for the foreign activities of individual firms. Because the analysis is based on firm data, it can also highlight certain aspects of the evolution of multinational activities, e.g., the role of firm size and of alternatives to growth through foreign investment and the dependence of the volume of foreign production on the length of time firms have produced abroad. These are some of the questions to which we now turn.

Chapter 6

Firm Size, Diversification, Age, and Foreign Production

Firm size plays an important role in the literature on the determinants of foreign production. Multinational operations are often considered a large firm phenomenon and an oligopolistic market structure the environment in which it arises. The line of causality is not always clear, however. Does firm size explain foreign production activities or is it a proxy for the factors which cause firms to be large both at home and abroad? It often seems to be the former. Caves [1971], for example, bases his oligopoly theory of foreign investment partly on the assumption that the large fixed cost in going abroad biases large firms to foreign investment. Hymer [1960] and Kindleberger [1969], also proponents of an oligopoly theory of direct investment, include among the market imperfections which would explain foreign direct investment the ability of large companies to borrow at lower cost in capital markets.

The view offered here is different from the oligopoly theory. In Chapter 2 it was argued that it is not necessary to bring in factors related to an oligopolistic market structure (in the sense of large firm concentration and interdependent decision making) to explain foreign investment. In Chapter 4 the proposition was that domestic growth is likely to precede foreign expansion. What counts then is the relative profitability of alternative growth routes for a firm able to grow faster than its original market.

In this chapter we will investigate some aspects of the complex relationship between firm size and the foreign involvement of firms. We will start by looking at whether large firms are more likely to produce abroad than small firms. Then we will look at the relationship between domestic size and exports and foreign production propensities, holding, first, industry affiliation constant and, then, other determinants of foreign size constant. We will also examine the role played by the age of the firm's foreign manufacturing operations. Taken together the answers to these questions may tell a story about how firms go international.

6.1 The size of Swedish foreign investors

Some 260 Swedish firms reported that they had affiliates abroad in 1974. Less than half of these had manufacturing affiliates abroad and it is this smaller group of firms which represents our sample of Swedish manufacturing investors or "multinational firms".

Table 6:1 shows parent sales, exports and sales to foreign affiliates for the two groups of firms, i.e., those with manufacturing affiliates and those with sales affiliates (and minority interests in foreign manufacturing firms) only. It is apparent that firms which produce abroad have larger sales on the average, higher export shares and channel a much higher share of their exports to foreign affiliates.

Foreign manufacturing investors are large on the average not only compared to firms which have only sales affiliates abroad but also compared to all other Swedish firms. Of the 40 largest firms in Sweden, 34 had manufacturing affiliates abroad in 1974 and another 4 had sales affiliates or minority in-

Table 6:1 Swedish firms with manufacturing and sales affiliates abroad respectively: sales, exports,and exports to foreign affiliates in 1974
(Millions of kronor)

	Number of firms	Sales	Exports	Exports in % of sales	Exports to foreign affiliates	Exports to foreign affiliates in % of exports
Firms with manufacturing affiliates	109	79 100	38 100	48	13 400	35
Firms with sales affiliates only	155	27 900	11 600	42	1 600	14
All firms	264	107 000	49 700	46	15 000	30

For definitions, see Table 5:1.

Table 6:2 Size distribution of Swedish firms with manufacturing affiliates abroad and sales, exports and foreign production by size class in 19
(Millions of kronor)

Number of employees in Sweden	Number of firms	Swedish parent sales	Swedish parent exports	Affiliate production abroad	In % of Swedish parent sales: exports	In % of Swedish parent sales: affiliate production abroad
50-200	10	162	42	32	26	20
200-500	14	489	155	155	32	32
500-1 000	14	1 003	335	110	33	11
1 000-2 000	16	3 217	992	742	31	23
2 000-5 000	13	4 913	2 053	1 668	42	34
5 000-10 000	15	12 289	5 273	3 932	43	32
10 000-	11	19 295	9 695	6 665	50	35
All firms	93	41 368	18 545	13 304	45	32

For definitions, see Table 5:1.
Note: Firms for which information on some of the variables in the table are missing have been omitted. Most omitted firms are in the smallest size groups.

terests in foreign manufacturing. Only 2 firms in the food industry did not have any foreign interests.[1]

However, foreign manufacturing is by no means restricted to large firms. Table 6:2 shows the size distribution of Swedish manufacturing investors in 1970 based on their domestic employment. Although there is an overrepresentation of large firms among Swedish manufacturing investors compared to Swedish industry as a whole, a large number of small and medium sized firms have foreign manufacturing as well. In the table a quarter of the firms are seen to have less than 500 employees in Sweden. Actually, the percentage of small firms is much higher, but several small firms have been omitted from the table because they have not supplied information on some of the other variables shown.[2]

In Table 6:2 we see that large firms have larger sales, larger exports and larger foreign production than small firms do on the average. Furthermore, exports increase more than proportionately with increasing domestic size, as seen by the higher export ratios in the larger size classes. This is not the case with foreign production, however. The ratio of foreign production to parent sales does not increase smoothly with increasing average firm size.

On the basis of the average relationships in Tables 6:1 and 6:2 it would appear that there is a positive relationship between domestic size and whether firms produce abroad and between domestic size and the absolute but not the relative volume of foreign production. In addition, the relatively large number of small firms among manufacturing investors suggests that

[1] The 20 largest manufacturing investors are identified in Table C:11.

[2] The number of firms with less than 500 employees actually covered in the 1970 survey was 37 instead of 24. As noted earlier, this is still likely to be an underestimate of the total number of small firms with foreign manufacturing.

multinational operations are not exclusively a large firm phenomenon. In the rest of this chapter we will examine these tentative propositions a bit more closely.

6.2 Size and industry differences between "investors" and "non-investors"

The influence of firm size on the foreign investment propensities of firms has been analyzed empirically by Horst [1972b]. In a comparison over U.S. firms Horst finds that the only characteristics having an affect on whether firms produced abroad or not were firm size and the firm's industry. First, he compared firms which had manufacturing affiliates in Canada with those that did not ("the probability of being a Canadian investor") and, second, he compared firms which had manufacturing subsidiaries in at least six other countries with those that did not ("the probability of being a multinational investor"). In both cases firm size was the only variable which had a significant influence when industry affiliation was held constant. Furthermore, the probability of being a multinational investor was lower than the probability of being a Canadian investor for a given firm size.

Horst observes that characteristics such as labor or capital intensity, advertising or research effort "appear to be significant in simple comparisons between firms which do or do not invest abroad, but this appears to be due solely to the fact that foreign investors are concentrated in certain industries where all firms (investors and non-investors) have certain characteristics or to the fact that foreign investors tend to be larger than most firms, and all large firms differ systematically from small firms". His conclusion is that a theory of foreign investment behavior within industries may be "structurally identical to an industrial organization theory of domestic market shares". (Horst, ibid, p.261.)

We cannot make the same analysis on Swedish data, because there are no published statistics for consolidated firms, i.e., parent firms plus their majority owned affiliates in Sweden, which is the firm concept used here. Swedish census data only gives information on single firms (legal entities), not on consolidated groups of affiliated firms. We can, however, use our data to compare firms which produce abroad (108 firms) with those which have sales affiliates abroad only (155 firms) on the basis of size and industry.

Following Horst we use linear regression analysis to determine if size and industry affiliation are significant in explaining whether firms produce abroad. The dependent variable, Q, is whether the firm produces abroad or not (Q = 1 if the firm produces abroad, Q = 0 if it does not); $\hat{Q}$ may be interpreted as the predicted probability that a firm will produce abroad, given that they have a foreign sales subsidiary.[1] Firm size is measured by domestic sales (in billion Sw.kr) and industry affiliation is handled by a dummy variable. Using a linear functional form the following estimate was obtained, where only industries with significant coefficients have been included.

$$\hat{Q} = .41 + \underset{(3.33)}{.19}\ \text{Sales}^{***} - \underset{(3.59)}{.28}\ \text{Ind.}(11)^{***} - \underset{(2.05)}{.17}\ \text{Ind.}(7)^{***} + \underset{(1.73)}{.25}\ \text{Ind.}(15)^{*}$$

DF = 258

$\bar{R}^2$ = .12

F = 10.01***

[1] Although other methods, e.g., logit analysis, should be used when the dependent variable is a dichotomous variable, OLS has been used here because of the considerable computational advantages of this method. The case for which it is used here meets many of the criteria under which OLS should "tell roughly the same story" as alternative techniques, according to Goodman [1976]. Goodman, however, admonishes that one should avoid rigorous interpretation of estimated standard errors and R^2-statistics.

where

Ind.(11) = "all other" industry group

Ind.(7) = metal manufacturing

Ind.(15) = group of highly diversified firms.

Firm size is highly significant but only 3 out of 11 industry coefficients are significant.[1] The reference industry, i.e., the industry to which the industry coefficients are compared, is the highly "multinational" non-electrical machinery industry and we may note that only firms characterized as highly diversified (Ind.15) are more likely to invest abroad than this industry, while firms in the "all other" industry group (Ind.11, a combination of industries with very small foreign investment as wood products, stone and clay products and instruments) and firms in the metal manufacturing industry are less likely to produce abroad than firms in the reference industry.[2]

It is likely that the industry coefficients would have been more significant if the comparison had been between firms producing abroad and all other firms. The sample is highly biased towards exporting firms and, hence, export industries, which means that a larger proportion of all firms in major exporting industries such as paper and pulp is represented in the sample than is true of industries such as textiles and food. Therefore, if the comparison had included all firms, it is likely that the probability that firms in the latter two industries should invest abroad would have been significantly negative - and not insignificant.

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[1] Measuring domestic size instead by total parent sales, i.e., domestic sales plus exports, as is usual in U.S. studies, does not alter the results. Size becomes slightly more significant (partial F=13.49) and R^2 is higher by one percentage point.

[2] Although the remaining industry coefficients were not significant (at the 10 percent level), we may note that the following had positive coefficients: textiles and clothing, paper products, chemicals, electrical machinery. The following had negative coefficients: food and related products, paper and pulp, transportation equipment.

Illustrating the Swedish case graphically with a step function, as used by Horst, we note the same positive dependence of the probability that firms produce abroad on firm size.

To make the Swedish function a little more comparable with the corresponding probability function for the U.S., which is also drawn in Figure 6:1, firm size is here measured by total parent sales.[1] The U.S. function shows the probability that a U.S. firm of a given size will invest in Canada, but this is close to the probability that it invests abroad at all. A number of other differences in definitions and data remain, however, which make comparisons of numeric values of the two functions difficult.[2]

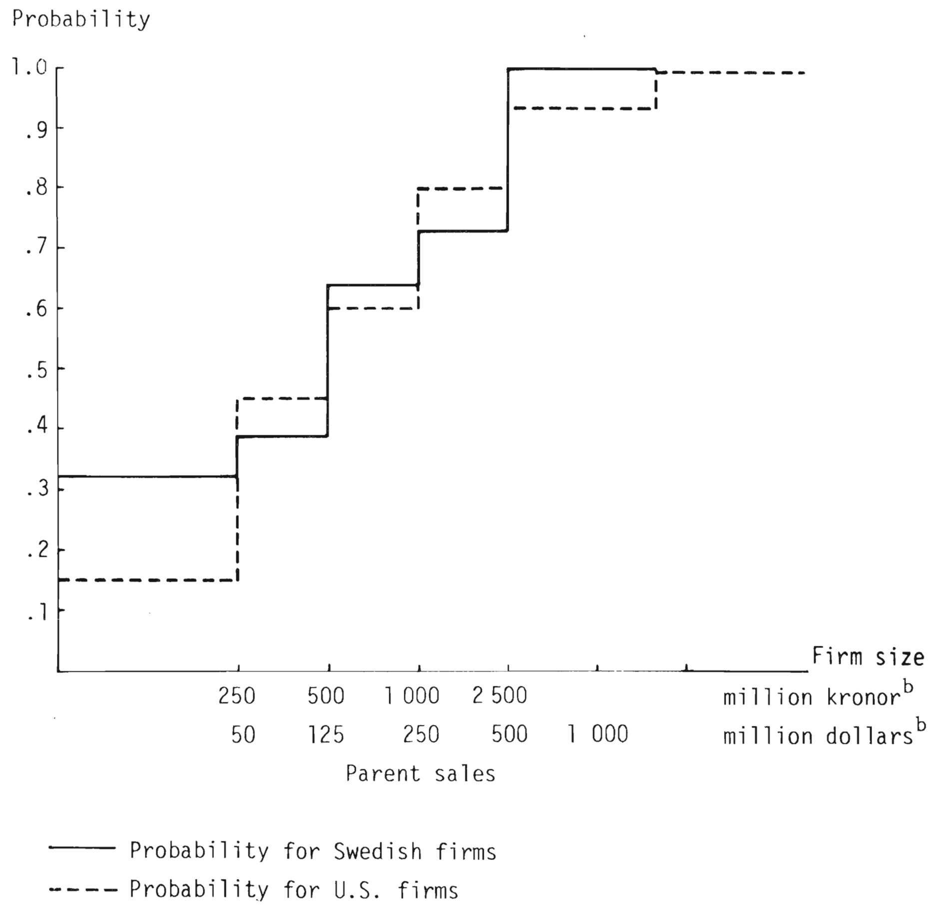
The following observation nevertheless appears safe. Small and medium size Swedish firms - with domestic sales, or domestic sales plus exports, of up to 250 million Sw.kr - are much more likely to produce abroad than U.S. firms of the same size. Firms in this size class make up a little over 70 per cent of all firms in the Swedish sample.[3] The probability that U.S. firms of that size (in 1967) had a Canadian subsidiary (sales or manufacturing) was around 15 per cent compared to over 30 per cent in the Swedish case. For larger firms the difference becomes smaller and no safe conclusion can be drawn.

[1] The probability function based on total sales (domestic sales plus exports) differs from one based on domestic sales mainly by being farther out along the horizontal axis.

[2] For example, Horst seems to include sales affiliates along with manufacturing affiliates in his definition of a Canadian investor, defining his sample simply as manufacturing companies holding "a majority interest in a Canadian subsidiary in 1967". The inclusion of sales affiliates would tend to raise the U.S. function relative to the Swedish. Our definition of "non-investors" as firms with foreign sales affiliates affects the comparison by, we conjecture, raising the Swedish function relative to the U.S. These two differences should then work in opposite directions.

[3] 79 per cent, if size is measured by domestic sales, and 71 per cent if size is measured by domestic sales plus exports.

Figure 6:1 Probability of being a foreign investor for Swedish and U.S. firms of a given size class[a]



[a] In the Swedish case it is the probability that Swedish firms will have foreign manufacturing affiliates, given that they have foreign sales affiliates. In the U.S. case it is the probability that U.S. firms will have a Canadian affiliate (sales or manufacturing).

[b] The exchange rate in 1967 was 5.2 kronor to 1 dollar, making the size classes in kronor and dollars roughly comparable.

Source: The U.S. probability function is from Horst [1972b].

Thus, it appears that Swedish firms on the average are smaller when they venture abroad for the first time, as one would expect given the smaller size of the Swedish home market. This, in turn, suggests that it is the firm's size relative to the market rather than its absolute size that determines when it ventures abroad for the first time.

In sum, the results indicate that the firm's domestic size significantly affects whether firms produce abroad or not. Whether this is the most important factor differentiating between Swedish firms which do and do not produce abroad we cannot tell. Broad industry differences, as captured by a crude industry classification, appear less significant in the Swedish sample, but this may well be due to the above mentioned bias in the sample.

However, the evidence so far is consistent with all the views on the relationship between firm size and foreign investment mentioned above. It is consistent both with the hypothesis that firms will choose to exhaust the domestic market prior to venturing abroad and with the idea that large firms possess certain advantages making them more competitive in foreign markets. To shed further light on these issues we need to go further and ask if large firms invest more abroad, both in absolute and relative terms, than small firms do.

6.3 The relationship between domestic and foreign size

For size itself to be a source of firm-specific competitive advantages, as seems to be implied by the oligopoly theory of foreign investment, it is not enough that large firms are more likely to invest abroad. Nor is it enough that size is positively correlated with the volume of foreign sales and production. That would merely mean that whatever it is that makes firms big at home would also tend to make them big in foreign markets. This is a rather trivial conclusion. To be less trivial, size should be positively correlated with the volume of foreign sales and production normalized for the domestic size of the firm. The empirical implication of a firm-specific advantage due to size, in other words, should be that big firms should have a higher propensity to sell and to produce abroad than smaller firms.[1]

We will interpret a positive relationship between firm size and foreign production propensities as consistent with the idea that large firms have a competitive advantage vis-à-vis small firms in foreign markets. Yet, clearly, it is not the only interpretation that may be given such a finding. Even assuming that it reflects a positive causal relationship between domestic and foreign size, and not just the influence of factors jointly affecting both, we do not know the line of causality. Just as one can argue that economies of domestic firm size enhance the firm's competitive position in foreign markets, it is possible to argue that large foreign operations enhance the firm's competitiveness in the home market.

To test the proposition that firm size and industry affiliation affect the propensity to produce abroad we will relate the firm's size at home to its size in foreign markets for each industry. By holding industry affiliation constant we control for broad industry characteristics and also come closer to using a relative size measure.

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[1] The advantage of firm size, as put by Dunning [1977], "is that which a branch plant of a national enterprise may have over a de novo enterprise (or over an existing enterprise breaking into a new product area), again producing in the same location. This arises because, while the branch plant may benefit from many of the endowments of the parent company, for example, access to cheaper inputs, knowledge of markets, centralized accounting procedures, administrative experience, R and D etc., at zero or low marginal cost, the de novo firm will normally have to bear the full cost." (Ibid,p.401.) Again, one may note the failure of this sort of theory to explain how the large firm came to acquire its current size.

Due primarily to the small number of Swedish foreign investors (but also to their product heterogeneity) an intra-industry analysis can only be carried out within rather broad industry categories and with a very small number of independent variables. The industry categories correspond to 2-3 digit SNI groupings. Six of the 10 industry groupings distinguished correspond to the (2 digit SEC) industry classification used by Horst in the above-mentioned study.[1] Three are combinations of 2 and 3 digit SNI groups (clothing, chemicals and other manufactures) and a final category is made up of highly diversified firms which cannot be fitted into any of the other industry groupings.[2] Even with such a crude industry classification the number of observations in some industries is so small as to make the results rather volatile. Only four industry groups contain 13 or more observations and of these perhaps only one is a relatively homogeneous industry, namely, the clothing industry. Therefore, it is also debatable whether one is really using a very meaningful measure of industry affiliation.

Table 6:3 shows the results of regressing firm size (S_H), measured as volume of domestic sales, on the volume of exports (S_X) and foreign production (S_Q) both overall and by industry. The product diversification measure (Div.) is included to take account of inter- and intra-industry diversification. The expected influence of this variable is negative, while the expected influence of firm size is positive. Since the regressions are (again) in double logarithmic form, the coefficients are elasticities. For size to be associated with a higher propensity to sell and to produce abroad the elasticity of exports and foreign production with respect to size must be greater than unity.

[1] Horst, who had 20 industries, noted that there was no significant difference between using 2 and 3 digit SEC classifications.

[2] Firms are defined as diversified when their output in any one 2 or 3 digit industry does not amount to at least 60 per cent of their total output.

Table 6:3 Firm size and the volume of exports and foreign production by industry (1974)

	Dep. var.	Const.	Indep. variables S_H	Div.	DF	$\bar{R}^2$	F
All firms	S_X	-.78	1.02*** (13.48)		94	.65	181.65***
	S_Q	-.62	.95*** (11.33)		95	.57	128.41***
By industry							
Textiles, etc.	S_X	-.38	.91* (1.98)		10	.21	3.92*
	S_Q	.89	.75** (2.52)	-2.78 (1.79)	10	.30	3.62*
Paper, pulp	S_X	2.43	.76** (3.43)	2.62 (1.28)	6	.61	7.31**
	S_Q	.68	1.21 (1.29)	-9.29 (1.08)	6	.06	1.27
Chemicals, etc	S_X	.34	.89*** (4.58)		12	.60	20.98***
	S_Q	1.07	.76** (3.01)		12	.38	9.06**
Primary metals	S_X	-5.59	1.40** (3.86)		5	.70	14.93**
	S_Q	-8.21	1.51* (2.53)		5	.47	6.38*
Metal products	S_X	3.58	.65*** (4.45)		7	.70	19.77***
	S_Q	-2.24	1.18** (3.41)	-4.75 (1.94)	6	.63	7.82**
Non-el. machinery	S_X	.68	.94*** (3.81)		11	.53	14.51***
	S_Q	-1.95	1.16*** (5.73)		11	.73	32.83***

cont.

cont.(Table 6:3)

	Dep. var.	Const.	Indep. variables S_H	Div.	DF	$\bar{R}^2$	F
El. machinery	S_X	2.83	$.94^{***}$ (10.36)	-4.14^{*} (3.06)	2	.96	53.75^{**}
	S_Q	5.61	.82 (2.45)	-8.01 (1.61)	2	.55	3.49
Transport equipment	S_X	-2.34	1.15^{***} (6.29)		4	.88	39.53^{***}
	S_Q	-.88	$.97^{***}$ (5.33)		4	.84	28.38^{***}
Other manuf.	S_X	-.06	$.89^{**}$ (3.07)		10	.43	9.45^{**}
	S_Q	1.07	$.80^{***}$ (3.19)		10	.45	10.19^{***}
Mixed industry	S_X	-5.36	1.35^{***} (1.28)		8	.66	18.61^{***}
	S_Q	-2.05	1.05 (1.18)		8	.04	1.40

The numbers in parentheses are t-statistics. *, **, *** indicate significance at the .10, .05 and .01 level respectively. $\bar{R}^2$ is corrected for degrees of freedom (DF).

In the regressions over all firms and industries domestic size has a strong positive effect on both the volume of exports and the volume of foreign production and "explains" a considerable portion of inter-firm variance in both ($\bar{R}^2$ = .53 and .73 respectively). The elasticity of both exports and foreign production with respect to domestic size is very close to unity. Thus, a 1 per cent increase in domestic size is associated with a 1 per cent increase in both exports and foreign production.[1]

The within industry regressions show that there is a positive relationship between domestic and foreign size in all industries and that this is significant in most industries. The elasticities of exports and foreign production with respect to domestic size vary between .6 and 1.5.

Given the small number of firms in each industry it would be hazardous to make too much of industry differences in the role of domestic size. The general picture does not, however, support the idea that larger firm size, either absolute size or size relative to the firm's industry, is associated with a higher propensity to sell or to produce abroad. Most elasticities hover around unity implying that domestic and foreign size increase proportionately and, consequently, that there is no relationship between domestic size and the propensity to sell and to produce abroad. The scatter plots in Figures 6:2 and 6:3 illustrate how smoothly exports and foreign production increase with increasing domestic size.

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[1] It is worth noting that although the relationship between domestic size and exports was equally strong in a linear formulation, the relationship between size and foreign production was very weak and barely significant.

Figure 6:2 Scatter diagram of exports against domestic size (logarithmic values)

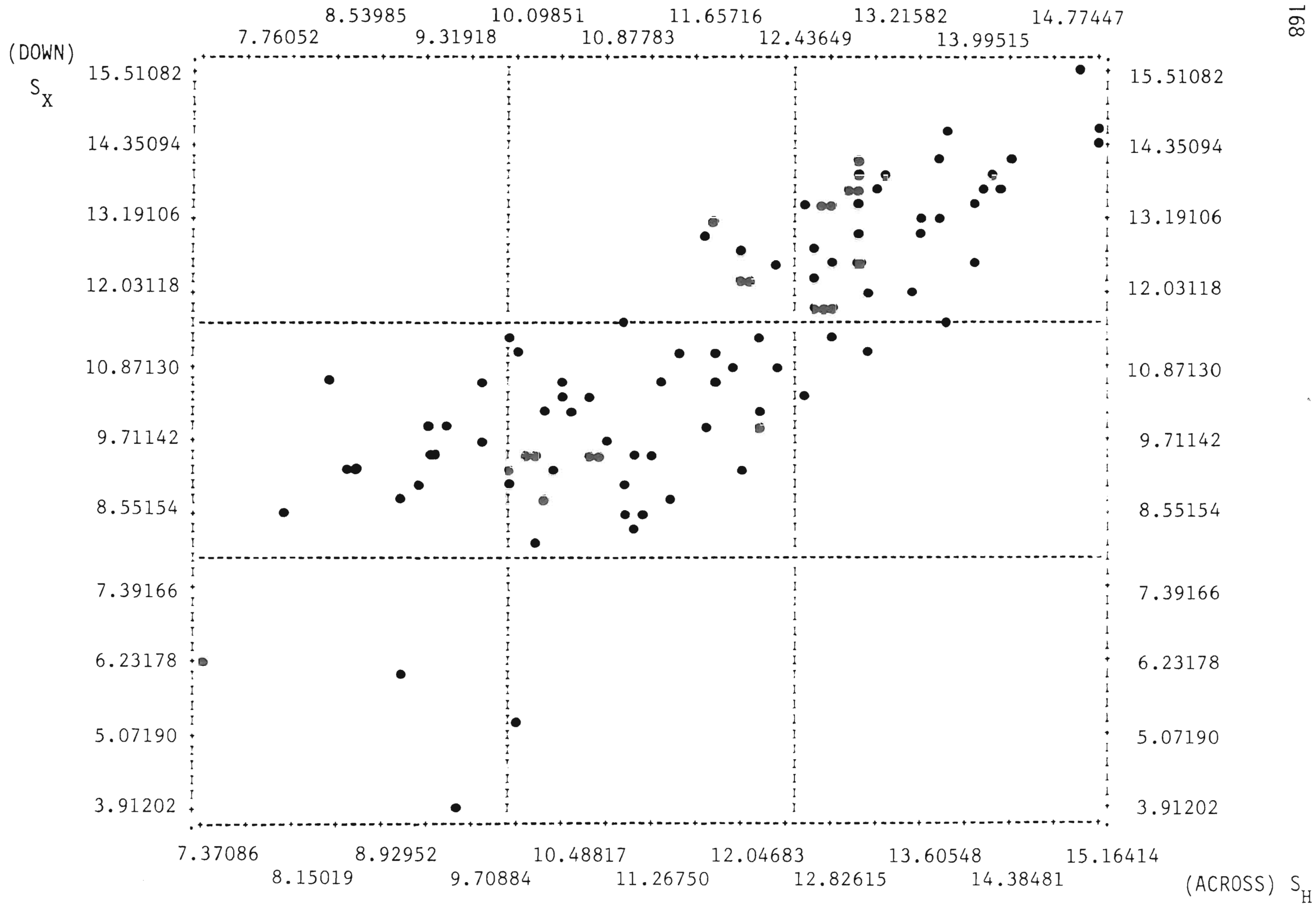
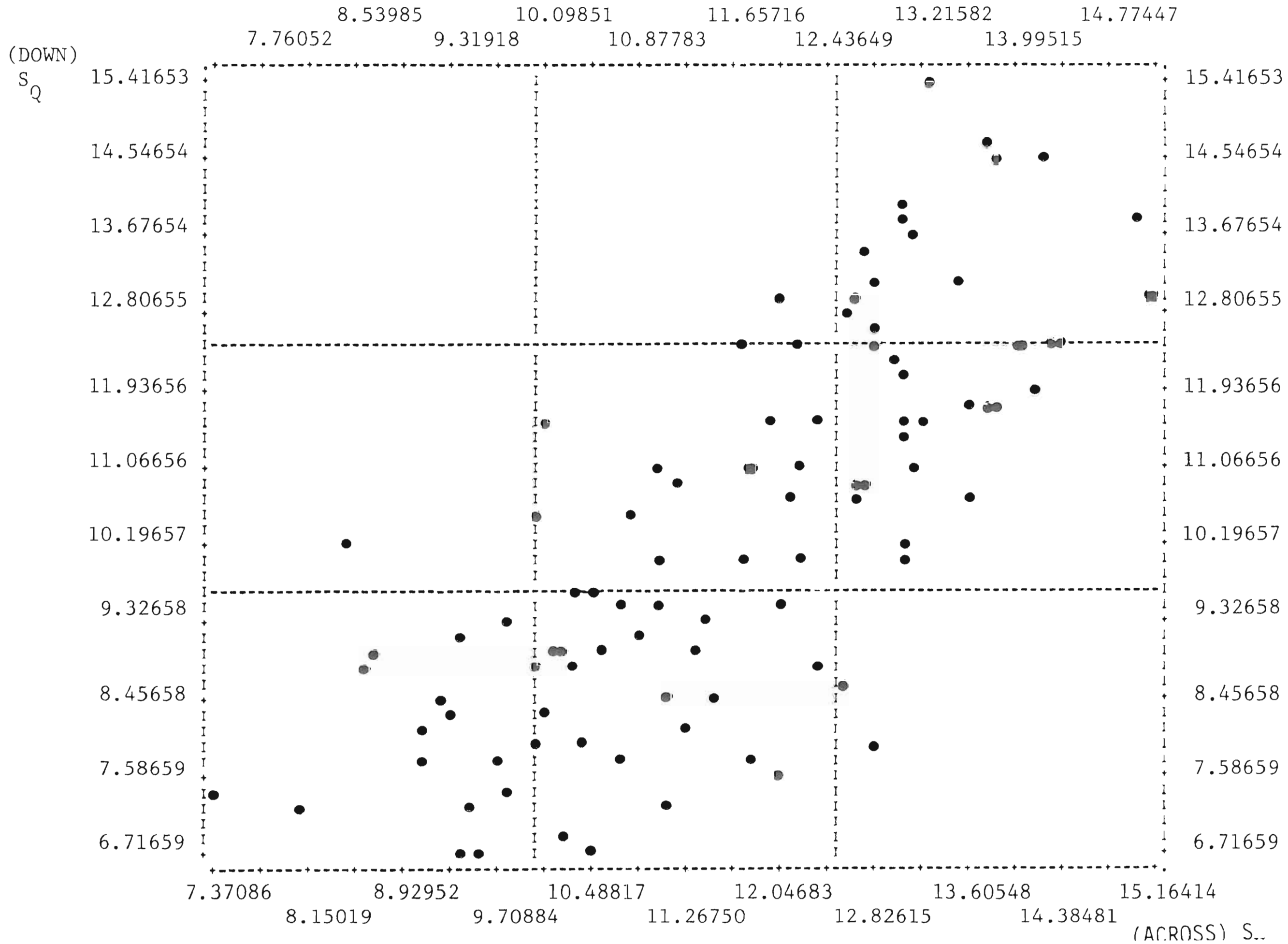


Figure 6:3 Scatter diagram of foreign production against domestic size (logarithmic values)



Product diversification (Div.) has not been included in the regressions over all firms because of the high degree of multicollinearity between this variable and domestic size. If it had been included, it would have been significantly positive in the exports regression and insignificant in the foreign production regression. It has been excluded from some of the within industry regressions for the same reason. In no case was a significant coefficient excluded, however. Multicollinearity was never severe when diversification had the expected negative sign, which accounts for the negative coefficient in most cases where the variable has been included. Of course, a high multicollinearity between size and the degree of product diversification is not surprising, since domestic size is just as much a determinant of product diversification, or vice versa, as it is of geographic diversification through exports and foreign production.

Since both domestic and foreign size depend positively on the firm's competitive advantage, it is likely that the strong performance of the domestic size variable in Table 6:3 in part reflects the common influence of factors affecting competitive power. That, in turn, means that the elasticity of exports and foreign production with respect to size is overestimated when size is the only explanatory variable.

The simple correlations in Table 6:4 show that domestic size is indeed related to the same firm and industry characteristics as foreign size. In some cases these characteristics are as strongly correlated with domestic size as they are with, especially, the volume of exports, which accounts for their weak influence on the propensity to export in the analysis in Chapter 5. This is true of capital intensity, the age of foreign manufacturing and the

Table 6:4 Correlation coefficients: the volume of exports, foreign production, and domestic sales and the independent variables[a]

	RD	LS	KL	NR	S_H	Div.	SC	YR
S_X	0.25803	0.33135	0.40512	0.34207	0.81178	0.68814	0.73109	0.51030
S_Q	0.35686	0.38615	0.20488	0.13202	0.75814	0.54616	0.52723	0.70052
S_H	0.12136	0.24911	0.41280	0.26343	1.00000	0.69686	0.68611	0.46507

	RD	LS	KL	NR	S_H	Div.	SC	YR
RD	1.00000	0.33183	0.02260	-0.11828	0.11517	0.17091	0.10027	0.28210
LS	0.33183	1.00000	0.30793	0.10173	0.22632	0.24857	0.21393	0.14868
KL	0.02260	0.30793	1.00000	0.46048	0.39912	0.34631	0.51099	0.07663
NR	-0.11828	0.10173	0.46048	1.00000	0.26036	0.26573	0.51868	-0.00268
S_H	0.11517	0.22632	0.39912	0.26036	1.00000	0.69228	0.68269	0.46729
Div.	0.17091	0.24857	0.34631	0.26573	0.69228	1.00000	0.52442	0.39671
SC	0.10027	0.21393	0.51099	0.51868	0.68269	0.52442	1.00000	0.35385
YR	0.28210	0.14868	0.07663	-0.00268	0.46729	0.39671	0.35285	1.00000

[a] The variables are in logarithmic form. 1974 values.
Definitions of variables are given on pp. 109 and 122.

degree of product diversification. The regressions in Table 6:5 present the same picture.[1]

Including other explanatory variables along with firm size in the exports and foreign production regressions has the predicted effect on the estimated relationship between domestic and foreign size. The elasticity of exports with respect to size has fallen to .5, while the corresponding elasticity of foreign production has fallen to .7. Thus, instead of a zero relationship between domestic size and exports and foreign production propensities, as in Table 6:3, we now have a negative relationship. The larger the firm is in the home market, the smaller it is in foreign markets relative to at home. This result suggests that expansion in the home market and in foreign markets are alternative ways in which the firm can grow.[2]

Although size alone continues to "explain" a major share of inter-firm differences in the volume of exports and foreign production, other firm and industry characteristics also continue to be important. For example, characteristics related to a competitive advantage, such as R&D and skill

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[1] It comes as no surprise (cf. p. 88) that the determinants of the volume of domestic sales and of exports should be rather more similar than the determinants of foreign production. The reason is that locational factors which favor domestic production should have a positive effect on both S_H and S_X but a negative effect on S_Q. In the regressions on S_H and S_X the positive effect of locational factors is fully captured - again due to multicollinearity - by the scale economy variable. In the regression on S_Q their negative effect is shown by the role of capital intensity.

[2] The performance of the product diversification variable is, however, disappointing in this context. Since product diversification in the home market is an alternative to geographic sales diversification, we would have expected it to be more strongly correlated with domestic sales than with exports. Instead, this variable, as measured here, is inextricably linked to the size of domestic production generally, i.e., both domestic sales and exports. It is less strongly linked to the volume of foreign production, which is seen most clearly when product diversification is plotted against foreign production and exports respectively.

Table 6:5 Firm size and other determinants of foreign size (1974)

Dep. var.	Const.	Independent variables R&D	LS	KL	NR	SC	YR	S_H	Div.	DF	$\bar{R}^2$	F
S_H	4.15	NI	NI	.15 (1.02)	-.74 (1.41)	.59*** (4.86)	.39** (2.04)		3.00*** (5.38)	91	.63	34.47***
S_X	-4.05	5.95 (1.69)	.83 (1.57)	NI	NI	.51*** (4.24)	.36* (1.81)	.52*** (4.92)	1.53** (2.33)	89	.76	50.88***
S_Q	-4.87	7.52** (2.25)	1.81*** (3.60)	-.32** (2.43)	NI	NI	1.29*** (6.79)	.71*** (9.57)	NI	91	.78	69.60***

NI = not included because t < 1.

The numbers in parentheses are t-statistics. *, **, *** indicate significance at the .10, .05 and .01 level respectively. $\bar{R}^2$ is corrected for degrees of freedom (DF).

Definitions of variables are given in Table 5:6 on p. 122.

intensity have an independent influence on foreign size. The unabated importance of the YR variable in the foreign production regression is also conspicuous. It confirms that domestic sales growth and growth through foreign production do not occur in a parallel fashion. The longer the firm has been producing abroad, the larger is foreign production relative to domestic sales and production. An intertemporal interpretation of this result is that foreign growth exceeds domestic sales growth, once the firm has established production abroad.

On the face of it, the negative effect of domestic size on the propensity to produce abroad is paradoxical given that 1) size has been shown to have a positive effect on whether, or when, the firm establishes foreign production and 2) that YR has a positive effect on the propensity to produce abroad. Given 1) domestic size should also have a positive effect on the volume of foreign sales relative to domestic sales, unless domestic sales growth is more rapid than foreign sales growth after foreign production has been started. The latter is contradicted by 2), however.

The resolution of the paradox is, I think, that one should be careful in interpreting the influence of size on when firms venture abroad. The earlier results did not show that firms were the same size when they first ventured abroad but only that the larger they are now, the more likely they are to have ventured abroad. Furthermore, domestic size, though a significant factor, is only one of several factors which determine whether, or when, to establish foreign production.

Although the foregoing analysis has been too crude to allow us to disentangle the various ways in which domestic size interacts with foreign size, it does point to some conclusions.

On the one hand, our findings contradict the common notion that large firms invest <u>relatively</u> more abroad than small firms do, due to advantages of firm size or oligopoly considerations. They also show that foreign investment is by no means exclusively a large firm phenomenon.

On the other hand, the results are consistent with the proposition that, one, there is a positive association between domestic and foreign size due to the simultaneous dependence of both on factors affecting them jointly and, two, domestic size has a bearing on whether, or when, firms venture abroad. Moreover, once production has been established abroad, the results suggest that growth in foreign markets through local production exceeds domestic sales growth, as one would expect if firms tend to exhaust the domestic market prior to venturing abroad. They also indicate that domestic and foreign sales expansion are alternative ways in which the firm can grow, since the larger the firm has grown in the home market, the less it has grown in foreign markets relative to at home.

6.4 Comparisons with some related studies

The conclusions reached above are at some variance with those drawn in other studies. For example, Wolf [1977] finds that the elasticities of foreign sales and production propensities with respect to the domestic size of U.S. firms are greater than unity, which conforms to his hypothesis that large firms have a competitive advantage related to absolute size.

Wolf takes an approach similar to the one adopted here and views geographic diversification and diversification into other product markets as alternative ways in which the firm may expand beyond its original market. Using U.S. industry data he explains the propensity to export, to produce abroad and to diversify into other industries by the average size of (the larger)[1] firms in the industry and technical personnel intensity. The propensity to export and to produce abroad is defined in the same way as here, namely, as sales and foreign production respectively relative to total sales in the U.S. (by industry). The industrial diversification propensity is defined as the volume of sales by firms in industry i outside industry i relative to industry i sales.

Although Wolf is aware of the ambiguous causal relationship between, e.g., domestic and foreign size, he nevertheless sees the former as a determinant of the latter. Technical personnel intensity is assumed to reflect a technological knowledge advantage. Both explanatory variables are found to be positively related to each of the diversification propensities. The highest explanatory value is obtained, however, when the dependent variable is total diversification, i.e., the sum of the three propensities.

How can one account for the fact that Wolf finds a positive relationship between size and the propensity to export and to produce abroad, while we have found a negative relationship? Barring differences between U.S. and Swedish firms on this score, the answer must be either that industry data (especially average firm size) are not appropriate for this analysis or that Wolf failed to include other industry characteristics which cause firms to be large both at home and abroad. Wolf notes that it would have been preferable to use firm data instead of industry data.

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1 "In obtaining the average size of firm, the smallest firms in the industry, accounting for roughly 30 % of industry assets, were eliminated so as to give a more meaningful representation of the average size of firm in an industry." (ibid, p. 181). It is hard to see why this would be more meaningful and how it might affect the results.

Knickerbocker [1973] and Caves [1974], in two rather different studies, cite evidence in support of the "oligopoly theory" of foreign investment. Since we have played down, if not dismissed, the role of oligopoly factors in explanations of multinational operations, it is worth observing that Knickerbocker's and Caves' findings do not necessarily contradict our own conclusions. Knickerbocker's study was designed to test the hypothesis that foreign investment was explainable by oligopolistic behavior. He calculates an entry concentration index showing the extent to which the establishment of foreign subsidiaries is bunched in time. He finds this index to be positively correlated with industry concentration, which is consistent with the idea that oligopolistic firms establish foreign production at the same time to prevent competitors from gaining a headstart in foreign markets. The entry concentration index is negatively correlated with product diversity and R&D intensity. This is taken to indicate that "oligopoly reaction" is reduced when firms have diverse investment opportunities, i.e., when they can diversify into other product markets at home, or when their competitive advantage is based on know-how.

Knickerbocker's results can be interpreted as consistent with an "oligopoly theory" of foreign investment. But they can also be given an interpretation which is consistent with the contention in Chapter 2 that oligopoly is not a necessary feature of the foreign investment process. For one thing, as noted by Hufbauer [1973], the fact that the establishment of foreign subsidiaries is bunched in time need not imply oligopolistic behavior but could also indicate that profitable investment opportunities open up at the same time for all firms. For another, the positive relationship between industry concentration and the number of affiliates established at a time may reflect the fact that large firms tend to invest more abroad, at least in absolute terms. Furthermore, the fact that some firms are able to exploit their competitive advantage through product diversification or exporting does not say anything about "oligopoly reactions".

In a similar vein, one may question whether the positive relationship found by Caves [1974] and reported on earlier (p. 146) between the dominance of multiplant firms in an industry and the production share of U.S. firms in the corresponding Canadian industry is sufficient evidence to support his contention that firm size and an oligopolistic market structure are part and parcel of the foreign investment process. The dominance of multiplant firms in an industry indicates that firms in that industry tend to grow through geographic sales diversification and that distant markets are more profitably served through local production. Caves' finding that such firms are more likely to (eventually) set up production facilities in Canada than firms in an industry characterized by economies of large plant size or firms for whom diversification into other product markets is a relatively more attractive growth route makes sense. On *a priori* grounds it is not clear why oligopoly conditions should be more prevalent in the former case than in the latter.

6.5 "Old" and "new" investors

The length of time that the firm has been producing abroad has been shown to be one of the most important factors determining both the absolute and relative volume of foreign production. We have interpreted this as showing that domestic and foreign expansion do not occur in a parallell fashion and that, consequently, the firm's current size in foreign markets depends on when it started growing. Age affects size then, both because growth costs mean that it takes time to grow large and, which is probably more important in a long time perspective, because accumulated learning in the firm is a function of the time integral of past output. But the year variable may capture influences other than those having to do with the age of foreign manufacturing. In particular, it may capture what are different characteristics of "old" and "recent" investors respectively. The purpose of this section is to examine this ambiguity.

Old and recent investors may differ in several respects. On the one hand, firms just entering the multinational arena may merely be firms whose growth process started later (or which were "born" later). They may differ from established foreign investors only in age and, hence, in that they have not yet had time to build up their foreign manufacturing operations and not yet accumulated as much (firm-specific) learning.

On the other hand, recent entrants may differ from established, or "mature", multinational firms in many other respects also, e.g., in innovativeness, industry affiliation and rate of growth. One hypothesis might be that innovativeness (knowledge of new products or processes) is relatively more important in enabling firms just venturing abroad to compete through foreign production than it is for already established multinational firms. The reason is that recents entrants are at more of a disadvantage vis-à-vis local producers in a foreign country than are firms which have been producing abroad for a long time, since they have less knowledge about managing multinational operations.

Furthermore, it is possible that new investors are firms which in recent years have encountered trade barriers or unfavorable production costs at home. For example, recent Swedish investors are to a large extent in other industries than are old investors. Most of the pre-1960 investors are in the chemicals, primary metals, metal products, non-electrical and electrical machinery industries, while a relatively large proportion of the 1960's and 1970's investors are in the food, textiles, paper and pulp, paper products and printing and transportation equipment industries. The latter group of industries accounted for less than 2 per cent of total assets in foreign manufacturing subsidiaries in 1960 and by 1974 this share had grown to close to 20 per cent.

Possible differences between old and recent investors may be analyzed by running the same regressions as in Chapter 5 for each group of investors separately. In Table 6:6 firms are divided into those which established foreign production in the period before 1960, in the period 1960-69 and 1970-74 respectively. This grouping corresponds to the intervals of the year variable (YR = 0 1970-74, YR = 1 1960-69, YR = 2 .....n pre-1960). To determine the influence of the age of foreign manufacturing operations we still include a year variable. For the pre-1960 investors it is defined as before and indicates the decade before 1960 when foreign production was started. For more recent investors it is redefined and indicates the year in the 1960-74 period when foreign production was started (1974 = 0, 1973 = 1,..., 1960 = 14).

Some noteworthy results emerge from Table 6:6. First, the year variable has the correct sign in the foreign production regressions. The fact that it is significant not only for all investors as a group, but also for old and more recent investors separately lends support to our initial hypothesis, namely, that the age of foreign manufacturing affects its size. Thus, it does not merely differentiate between the "old" and "recent" investors separated in the table, although this distinction does appear to be an important one, judging from the much higher significance of YR in the all firms regression.

Second, we may note that recent entrants do appear to differ from

Table 6:6 Determinants of the propensity to sell and to produce abroad: old and recent investors. (1974)

Dep. var.	Const.	R&D	LS	KL	NR	SC	YR	DF	$\bar{R}^2$	F
		Independent variables								
$(S_X+S_Q)/S_H$										
All firms	-4.35	7.22**	.96*	-.15	1.06*	NI	.38***	87	.30	8.77***
		(2.02)	(1.82)	(1.06)	(2.27)		(3.85)			
pre-1960	-6.62	3.09	2.02**	-.51**	.58	NI	.64*	23	.35	3.98**
		(1.15)	(2.73)	(2.26)	(1.06)		(1.99)			
1960-1969	-3.49	37.14***	1.06	NI	1.19**	NI	-.55	33	.29	4.77***
		(2.75)	(1.22)		(2.32)		(1.10)			
1970-1974	-1.02	24.38*						24	.10	3.94*
		(1.98)								
Q_A/Q_H										
All firms	-3.35	3.35	1.04**	-.40***	NI	-.27***	.72***	88	.53	21.65***
		(1.05)	(2.26)	(3.24)		(3.04)	(7.69)			
pre-1960	-2.59	3.32	2.28**	-.64*	1.07	-.65***	1.02**	22	.52	5.99***
		(0.88)	(2.06)	(2.04)	(1.25)	(3.21)	(2.11)			
1960-1969	-6.53	NI	1.05	-.53***	NI	NI	1.11	35	.33	7.38***
			(1.40)	(3.72)			(2.37)			
1970-1974	-0.58	NI	NI	-.91***	NI	NI	1.22***	23	.45	11.46***
				(3.77)			(3.38)			

NI = not included because $t < 1$.

The numbers in parentheses are t-statistics. *, **, *** indicate significance at the .10, .05 and .01 level respectively. $\bar{R}^2$ is corrected for degrees of freedom (DF).

Definitions of variables are given in Table 5.6 on p. 122.

established multinational firms. While differences in the relative volume of exports and foreign production among older investors are related to differences in skill intensity, such differences among more recent investors are to some extent explainable by variations in R&D intensity. Although the coefficients are not highly significant, it appears that the competitive advantage of recent investors to a larger extent is based on R&D activities. But this advantage only affects their propensity to export (S_X/S_H). It has no effect on the propensity to produce abroad (S_Q/S_H). This differential impact is consistent with our earlier finding that firms characterized by a high R&D intensity are relatively more likely to supply foreign markets through exports than through foreign production.

With respect to the other characteristics we note that a low capital intensity positively affects the volume of foreign production in the Q_A/Q_H regression for each group of investors. This variable is especially significant in the case of the 1960's and 1970's investors suggesting that firms in labor intensive activities may, in fact, have gone abroad in this period in search of cheaper labor. The dummy variable for the resource based industries is significant only in the regressions for the 1960's investors, reflecting the fact that a number of companies in the paper and pulp industry went abroad for the first time in that period.

Since the number of observations in these regressions is relatively small, I have examined bivariate plots of some of the variables to make sure that the estimated relationships are not solely the results of a few extreme observations. The plots broadly confirmed the picture in Table 6:5. For example, in the plots shown in Figures 6:4-6:6 we see that there is almost no relationship between capital intensity and the relative volume of foreign production for pre-1960 investors and a quite distinct negative relationship between

Figure 6:4 Scatter diagram of the propensity to produce abroad against the capital-labor ratio: pre-1960 investors (logarithmic values)

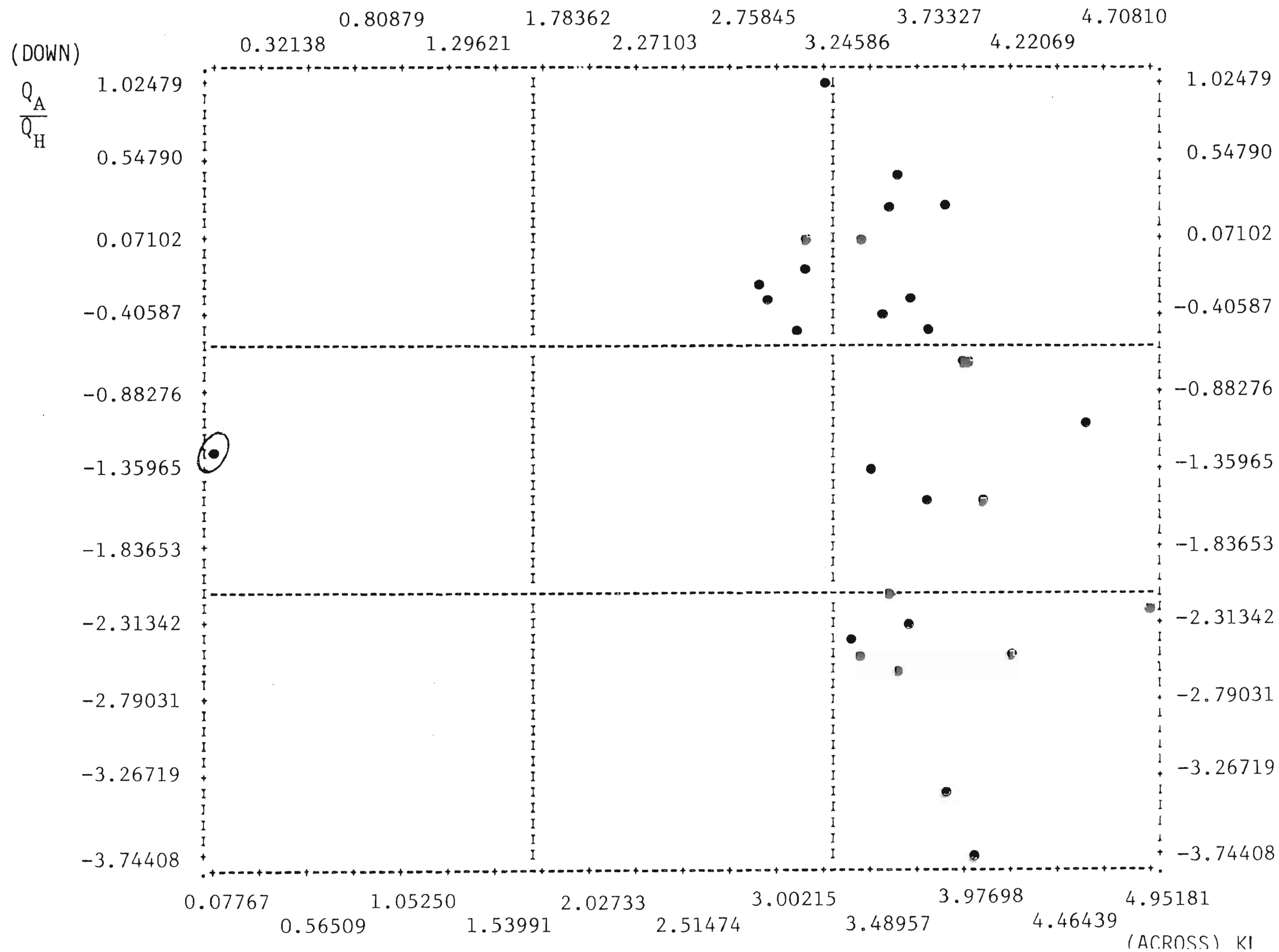


Figure 6:5 Scatter diagram of the propensity to produce abroad the capital-labor ratio: 1960's investors (logarithmic values)

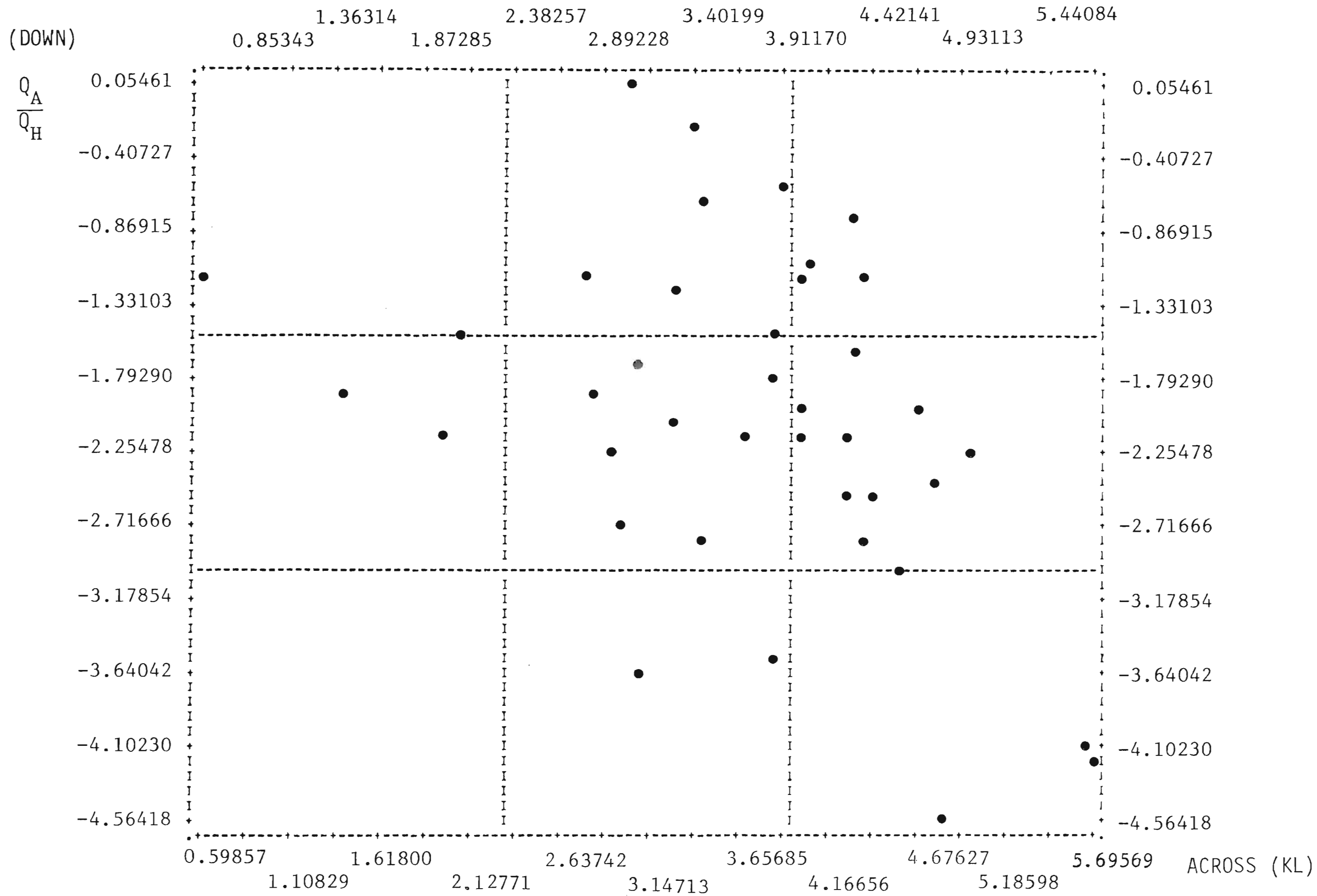
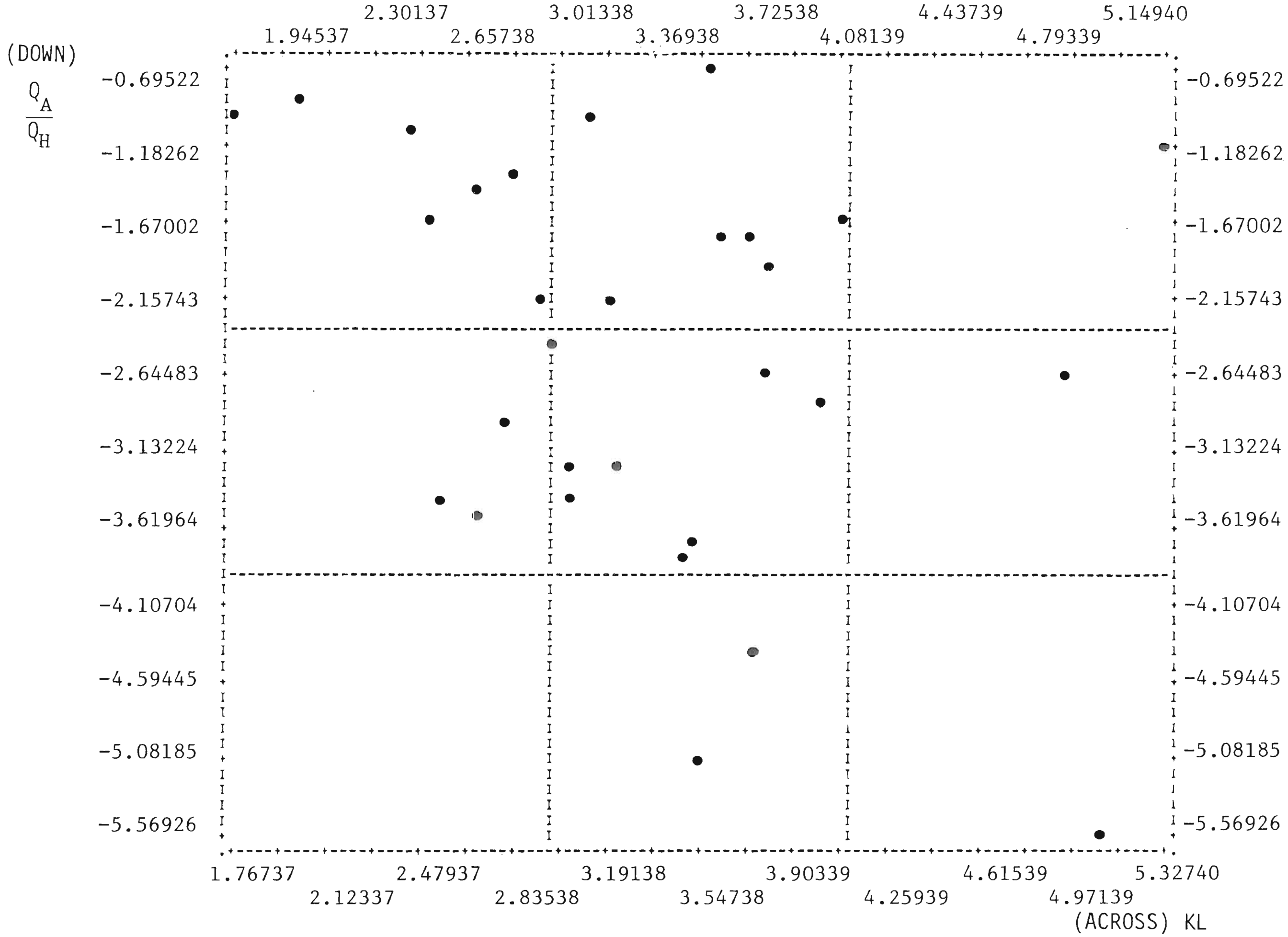


Figure 6:6 Scatter diagram of the propensity to produce abroad against the capital-labor ratio: 1970's investors (logarithmic values)



these variables for more recent investors. The differences in capital intensity among recent investors is much larger and these differences help explain differences in the propensity to produce abroad. Moreover, the observations in the respective tails of the fitted functions do not all belong in the same industries, as one might have suspected (e.g., clothing and paper and pulp at different ends of the spectrum), thus indicating that capital intensity is not merely another proxy for industry affiliation.

To conclude: The strong performance of the year variable in the all firm regressions reflect the influence of the age of foreign manufacturing operations. I interpret this to reflect, in part, the existence of growth costs and, in part, that the firm's competitive advantage in foreign production is affected by learning. However, it also captures the fact that the determinants of foreign production by more recent investors are not quite the same as they are in the case of the older, more established investors. For example, the influence of a high labor intensity on the propensity to produce abroad is more evident among the former than among the latter.

6.6 Summary and conclusions

In this chapter the role played by firm size and by the year when the firm first ventured abroad have been analyzed. The results tell a rather interesting story about how firms grow international, a phenomenon which has not been analyzed in quite this way before.

We started with the proposition that size in the home market affects the firm's choice between domestic and foreign sales but not its choice between exports and foreign production, nor its ability to sell and to produce abroad unless it is a proxy for a firm-specific advantage. Thus, the larger the firm is relative to its home market, the less profitable, presumably, it would be to expand its share of that market relative to entering new product markets (diversification) or new geographic markets (foreign sales). Whether growth in foreign markets comes from exports or foreign production - given its competitive advantage - depends on relative production costs at home and abroad, on the advantages of concentrated production due to large minimal efficient plant size and on the existence of barriers to trade.

Given economies of concentrated production, firms will choose to supply foreign markets from home country plants until such economies have been exhausted, unless or until such gains from large scale production are outweighed by higher input costs at home relative to abroad or by trading costs. Clearly, for growing firms, the point at which foreign production becomes a profitable alternative to domestic production will be an important determinant of the current volume of foreign production.

This line of theorizing has been borne out by the empirical results. The firm's size in the home market and the average plant size in the industries in which it produces go a long way in explaining the volume of exports. The larger the firm is in the home market and the more important are economies of large plant size, the more it tends to export. But in a comparison across firms exports increase less than proportionately with increasing domestic size indicating that firm size is not a source of - or a proxy for - a firm-specific advantage affecting competitiveness in foreign markets.

Domestic size also significantly influences whether firms produce abroad or not. The larger the firm is, the more likely it is to be producing abroad. There is some evidence that Swedish firms, especially in the smaller size classes, are more likely to produce abroad than U.S. firms. This suggests that it is the firm's size relative to the market, which determines the decision to produce abroad. Due to the smaller size of the Swedish market, in other words, Swedish firms find foreign production a profitable option at an earlier stage than do U.S. firms. Prior to venturing abroad U.S. firms will probably set up production in another state and, one may conjecture, will at that point be smaller than a Swedish firm going abroad.

In addition, firm size affects the volume of foreign production but, as in the exports case, the elasticity with respect to domestic size is less than unity. That is, large firms do not have a higher propensity to produce abroad than small firms do. Domestic size, rather than being a major source of competitive advantage as has been commonly held, is mainly a reflection of such an advantage. The dominant partial relationship between domestic and foreign size appears to be one of substitution, since the larger the firm has grown in the home market, the less it has grown in foreign markets relative to at home.

The year of first foreign establishment is the single most important factor influencing both the absolute volume of foreign production and foreign production relative to domestic production. It differentiates most notably between rather old (pre-1960) and relatively recent (1960's and 1970's) investors, but it has the predicted influence within these periods as well.

An intertemporal interpretation of the influence of this variable is that domestic growth precedes growth through foreign production and that, once the firm has established itself abroad, growth through foreign production exceeds sales growth in the home market. This is also consistent with the fact that Swedish foreign investors as a group have displayed a much higher rate of growth abroad than at home in the 1965-74 period.

Looking at older and more recent investors separately they were found to differ in ways that might have been expected. For one thing, differences in labor intensity play more of a role in explaining foreign production of firms establishing production abroad in the 1960's and 1970's than of older investors. This suggests that rising wages in Sweden relative to abroad in this period has been a factor influencing the decision to go abroad among these firms. Furthermore, the competitive advantage of relatively old (pre-1960) investors is related to a high skill intensity, while the competitive advantage of more recent investors (1960's and 1970's respectively) appears based on high R&D intensity. One way in which this might be explained is that an innovative advantage is relatively more important in enabling new firms to compete through foreign production than it is for already established multinational firms. Although the older investors presumably had a similar advantage in an earlier period, this advantage may become less crucial in enabling the firm to substain multinational operations once it is established abroad.

The above line of reasoning is highly conjectural on the basis of the analytical results, but it is consistent with casual observation. Practically all of the very old and very large Swedish multinational firms were founded on the basis of a Swedish invention or unique product developments. Examples are roller bearings (SKF), the safety match (Swedish Match)[1], the refrigerator (Electrolux), telecommunications (L.M. Ericsson), separators (Alfa Laval), pneumatic drills (Atlas Copco) and applications of gas energy (AGA). Not all of these companies have been able to sustain that level of innovation.

[1] The early multinational empire of the Swedish Match Company was, however, largely due to the financial dealings of its legendary owner, Ivar Krueger, who managed to secure a match monopoly in a large number of countries in Europe and Asia. Krueger's dizzying financial transactions brought a portion of Swedish industry and the then prime minister tumbling down after Krueger shot himself in 1932 (the "Krueger crash").

At the same time these examples, as well as other, more recent ones, caution one against seeing current R&D expenditures as a very reliable indicator of an innovative advantage. Quite frequently firms are founded on the basis of an invention and their current R&D efforts are not proportionate to those leading up to it.

Chapter 7

The Effect on Exports of Foreign Production Controls

One of the chief areas of controversy surrounding multinational firms in recent years has been the effect of foreign production on exports from the investing country.[1] Does foreign production replace home country exports or does it encourage such exports? The question is central to such larger issues as the implications of foreign investment for the balance of payments and for the level and pattern of employment, or income, in the investing country. The earlier analysis of the determinants of foreign production and exports has laid the groundwork for an analysis of this question, to which we now turn.[2]

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1 In the 1960's concern regarding the effects of foreign investment focused on the implications for the balance of payments. Reddaway's study for the U.K. [1968] and Hufbauer's and Adler's study for the U.S. [1968] made it clear that the balance of payments effects depended critically on what assumptions were made regarding the effects of foreign production on exports. Subsequently, the problem was formulated in terms of the effect on domestic employment of firms locating production abroad. But the problem is the same in that it concerns the extent to which foreign markets can be served via exporting from the home country instead of via production abroad. See, also, Dunning [1970], Horst [1974a] and Lipsey [1969, 1976a, 1976b].

2 Note that this is not a very meaningful question in the framework of the pure theory of international trade and investment, where an investment outflow is assumed to automatically generate an export surplus. The export surplus _is_ the real capital outflow in this model. Furthermore, capital exports _are_ always associated with an international relocation of production, from the capital exporting country to the capital importing country. At the end of the chapter we will compare the implications of trade theory with those to be discussed below, which are derived from the theory of the firm and which are independent of real adjustments by the economy as a whole to a net monetary outflow.

The preceding analysis has shown that the firm's exports and foreign production are determined simultaneously and by essentially the same factors, namely, by the firm's competitive power and by factors affecting the location of production. Increased competitiveness allows both higher exports and foreign production. Increased barriers to trade, or increased production costs in the exporting country relative to abroad, on the other hand, lead to reduced exports and increased foreign production.

It bears repeating (cf. Chapter 4 and Appendix A) that the simultaneous determination of exports and foreign production means that one cannot speak of "the effect of foreign production on exports". One can ask, however, what would be the effect of quantity controls on foreign production. The volume of foreign production then becomes a policy parameter and, for purposes of analysis, an exogenous variable. In what follows, therefore, we are trying to answer the policy question whether exports are larger or smaller than they would have been if foreign production had not been allowed to change, holding all other factors constant.

The analysis remains partial, i.e., it will be limited to the effect of foreign production controls on the exports of the investing firm. Before plunging into the empirical analysis, we will clarify the different interrelationships between exports and foreign production that might exist (Section 7.1) and also touch on the problems of estimating the effect of foreign production controls on the volume of exports (Section 7.2). In Appendix A, we show theoretically what the exports effects are in a model which incorporates some of these interrelationships and give a more formal treatment of issues relating to estimation.

At the end of the chapter, we will discuss the relationship between the effects of foreign production, or foreign investment, in a partial and general equilibrium setting and also state the likely macroeconomic implications of the partial exports effects analyzed in this chapter.

7.1 The interrelationship between foreign production and exports

Exports and foreign production can interact in several different ways. First, there is interdependence because the goods produced abroad may be substitutes for or complements to exports in production or in consumption. Foreign production affects exports, then, because the lower foreign price resulting from increased production abroad affects the demand for exports.

Second, quite apart from the relationship between the goods produced abroad and those exported, foreign production can affect factors which, in turn, affect exports. For example, foreign production can affect foreign demand generally, or it can affect the firm's overall competitiveness via economies of firm size.

Substitution and complementarity

In the case of a single-product firm, facing a less than infinitely elastic demand in foreign markets (and disregarding the indirect effects of firm size to be discussed below), the relationship between exports and foreign production is one of substitution. The reason is that foreign production, by making the aggregate foreign supply curve more elastic, will make the price abroad lower than it would have been with exports the only source of supply. (Cf. Fig. 4:1.) Constraining foreign production, therefore, should lead to a higher foreign price and an increase in exports.

For a multiproduct firm there are further effects to consider. The goods manufactured abroad may substitute for, complement, or be independent of the firm's other exports (i.e., the cross-price elasticities of demand may be positive, negative, or zero). Such interdependencies can exist both in production, as when different stages of production are located at home and abroad, and in consumption. If the firm's other products (inputs and final goods) are not independent, the lower price made possible through foreign production will lead to decreased demand for substitute goods and increased demand for complementary goods. In the former case there will be a further decrease in the firm's exports, while in the latter case increased exports of complementary goods will at least partly offset the reduction in exports of the goods produced abroad.

Even though cases of independence, substitutability, and complementarity are all easy to envisage, on balance it is likely that foreign production is complementary to the firm's exports of other goods. A common pattern, in practice, also seems to be for firms to produce some components or complementary final products abroad or locate assembly operations abroad. For example, practically all Swedish-owned foreign manufacturing subsidiaries import some intermediate products from the parent group.

Several reasons argue for locating the final stage of production abroad. First, an assembled product is often bulkier than the sum of its component parts and therefore more expensive to ship. Second, assembly operations are often relatively labor intensive, which should make foreign production attractive to firms based in a capital exporting country like Sweden, where wage rates are relatively high. Third, the tariff structure in most countries imposes a higher tariff rate on finished products than on intermediate products, so-called tariff escalation, presumably with a view to encouraging domestic production.

In general, it is unlikely that the firm will export products which are close substitutes to the products produced in the same country, since the factors which make local production profitable in the case of one are likely to make it profitable in the case of the other. For example, transportation costs, labor intensity and tariff levels probably differ less between close substitutes, which by definition are fairly alike, than between wholly different products, some of which may be complementary to the firm's other exports.[1]

Consequently, the net effect of foreign production on the firm's exports of goods other than those that are produced abroad may often be positive, thereby mitigating the decreased exports of the latter. On *a priori* grounds it is difficult to say anything about the likely size of substitution and complementarity effects.

Foreign production affecting the demand for exports generally

A positive relationship between exports and foreign production could be explained also by certain "institutional" factors. One such factor, which is far from unimportant in practice, is host country policy requiring that at least part of a firm's local sales be supplied from local production or,

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[1] It is, of course, possible that firms produce, e.g., a lower quality, lower priced product abroad and export a higher quality, higher priced substitute product. But what would make foreign production profitable in the case of one and not the other? One reason might be that the lower priced items are produced by less skilled and, hence, less expensive foreign labor. A reinforcing reason is that any given level of tariffs and transportation costs will raise the final selling price of the lower priced goods relatively more than that of the higher priced goods abroad. Barriers to trade would then be a relatively more effective deterrent to exports of the former than of the latter. Still, it is doubtful that the pattern of producing different quality lines is prevalent enough to explain most foreign investment.

more subtly, a policy of discriminatory government purchases which favors local producers. This may be motivated by considerations of national defense (as is the case with, e.g., telecommunication products) or be part of a conscious economic development strategy (as is common in many less developed countries). Usually such requirements are applied only to part of the firm's potential sales in the country, permitting the remainder to be supplied through imports - provided that the firm, in fact, produces locally. In such cases the effect of foreign production on exports is, of course, wholly positive, since trade restrictions on products produced locally are prohibitive and all imports are contingent on such local production.

Foreign demand can also be affected without government intervention by whether or not the firm is producing locally. Buyers may view local production as a commitment to that particular market, a guarantee for reliable and speedy delivery, or ensuring continuity of service, repair, etc. If this is so, the foreign demand curve for the firm's products should shift out as the firm establishes local production. Goodwill created in this way can also benefit products supplied by the firm through exports to the foreign market and cause demand for these to increase as well.

Economies of firm size

Another potentially important reason why there may be a positive relationship between exports and foreign production - at least in the long run - derives from the economies of firm size which were briefly touched upon in the foregoing chapter. An important kind of such economies is related to the fact that firms do not face a given demand for their products and that the most efficient production techniques are not costlessly known and available to them. Instead, firms expend resources to provide information about their products, or otherwise increase demand for their current or contemplated output, as well as to obtain information about what to produce and the least costly way to produce it.

All of these activities involve an investment cost to the firm. The amount that it will pay the firm to invest in them depends positively on the volume of sales, since larger sales mean that the chosen investment cost can be spread over a larger volume. For example, information about production techniques, goods or factor markets can, once it has been obtained, be made available at no or little additional cost to all manufacturing plants and sales divisions of the firm. Similarly, an advertising campaign benefits directly all the products being advertised and sometimes indirectly the firm's other products through goodwill established for the firm's brand-name. The building up of a distribution network also involves a large fixed cost. Although unlike information it does not have the characteristics of a public good within the firm (the marginal cost of additional use is not zero), it involves comparatively low operating costs.[1] Together these constitute economies of larger firm size.

Since the effect of allowing foreign production (cf. Figure 4:1), is to make not only foreign sales but total sales of the firm larger than they otherwise would have been, foreign production enables the firm to take advantage of economies of firm size. Compared to a situation where the firm is constrained to domestic growth, e.g., through product diversification, the firm can grow larger in what it knows best how to produce and market. It then pays the firm to invest more in advertising, R&D, a specialized and geo-

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[1] The large fixed costs derive, inter alia, from indivisibilities in the construction and maintenance of warehouses, automated handling of goods, etc. (Horst [1974a]).

graphically dispersed distribution network, etc., all of which benefits not only the manufacturing subsidiaries abroad but to varying degrees benefits also the firm's domestic sales and exports as well. Of course, the effect on exports of foreign production through enhanced competitive power, though potentially important, is more indirect than the other effects discussed above.

7.2 The "alternative position" and problems of estimation

The controversy regarding the effects of foreign production on exports has revolved around the question of what would happen "in the alternative position", i.e., what would happen if foreign production by home country firms did not occur. An extreme position was taken by Reddaway [1967, 1968] in his pilot study of the effects of U.K. foreign investment. Reddaway disposed of the potentially negative effect of foreign production on exports by simply assuming that the alternative to production abroad by U.K. firms would have been broadly the same output by non-U.K. firms, in which case U.K. exports would have fallen off in any case. Hufbauer and Adler [1968] in their study of the effects of U.S. direct investment used three alternative assumptions regarding what would happen in the absence of foreign production by U.S. firms and showed how sensitive the estimated effects on exports were to a change in assumptions.

Here we will use the model presented in Chapter 4 and Appendix A to estimate the effects on exports of allowing foreign production by regression analysis. Our regression equations capture the different kinds of "effects" discussed in this chapter, except those arising via economies of firm size. An explicit analysis of such indirect effects requires an enlarged simultaneous-equation model, where variables affecting competitive power are themselves partly determined within the model.

We have already (in Chapter 5) estimated the determinants of the relative volume of exports and of foreign production by reduced-form equations. What we will now do is to estimate the "quasi-reduced form" with foreign production as a further explanatory variable. In this analysis, where the foreign production coefficient will show the partial effect of exogenous changes in foreign production on exports, the "alternative position" is represented by firms which produce relatively less abroad or by countries in which firms produce relatively less, holding constant all other determinants of inter-firm and inter-country differences in exports.

In estimating the effect of changes in hypothetical foreign production controls it is essential that foreign production can be treated as an exogenous variable. 2SLS-estimation allows us to do so. By using the estimated value of foreign production instead of the actual value, foreign production becomes an exogenous variable in the exports equation and the ambiguous causal relationship that would otherwise exist is eliminated.

Earlier econometric work on this topic has used OLS to estimate the effects of foreign production on exports.[1] We will, therefore, present the results of both OLS- and 2SLS-estimation for comparison purposes and to see what may be learned thereby. Although estimation by 2SLS is, in theory, superior to OLS in estimating simultaneous-equation systems, at least in relatively large samples, it is possible that the choice of estimation technique is not essential given the crudeness of data and the incompleteness of our model. However, to the extent that the results of the two methods differ, we will interpret the 2SLS estimates as showing the partial effect on exports of exogenous changes in foreign production. We will

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[1] See the work by Horst [1974] and Lipsey and Weiss [1976], which will be referred to further below.

interpret the OLS estimates as incorporating the influence of omitted variables and of two-way causation.

7.3 Empirical results

The simple relationship between exports and foreign production by Swedish firms

As a backdrop to our analysis of the effect of foreign production controls on exports, let us look at the simple relationship between exports and foreign production by Swedish firms. Often inferences regarding the effects on exports of allowing foreign production are made on the basis of such a simple relationship. This is fundamentally misleading, as we have stressed above, since the observed association may solely reflect the influence of third factors which jointly affect exports and foreign production. Furthermore, it leaves open the line of causation.

In Table 7:1 we can discern a negative relationship between the rate of growth of total Swedish exports and of foreign production by Swedish firms in different countries. Export growth has been relatively modest to countries in which the rate of growth of foreign production has been relatively high, e.g., in the EEC, in Europe outside the trading blocks (especially Spain), and in Latin America. The negative relationship between export growth and foreign production growth is strongest in the 1965-70 period, where the Spearman rank correlation is -.65 and significant (at the 5 % level). In the later period other factors apparently interfere. The relationship, though still negative, is weak (Spearman rank correlation -.20) and no longer significant. We can interpret this negative relationship as showing the influence of locational factors affecting exports and foreign production in opposite directions.

Table 7:1 Net sales by foreign manufacturing affiliates relative to Swedish exports by region 1970 and change 1965-70, 1970-74

	Affiliate net sales / Total foreign sales (%)	Percentage change			
		Affiliate net sales		Swedish exports	
	1970	1965-70	1970-74	1965-70	1970-74
Industrial countries	29	83	93	66	96
EEC	42	103	96	52	87
EFTA	15	92	78	79	97
of which					
Nordic countries	12	120	94	79	93
Other Europe	11	327	368	39	175
North America	37	16	94	76	83
of which					
U.S.	36	9	89	70	79
Other industrial countries[a]	42	104	74	40	124
Less Developed countries	31	76	78	92	140
Africa	5	10	224	128	74
Asia	22	7	26	94	162
Latin America	49	131	90	69	121
World	29	82	91	69	101

Affiliate net sales are total sales by manufacturing affiliates less imports from Swedish parent firms. Total foreign sales comprise affiliate net sales plus total Swedish exports. Swedish exports exclude exports to the Eastern European countries.

[a] Australia, New Zealand, South Africa.

Source: Tables C:5 and C:6 in Appendix C and Utrikeshandel, Del 2.

By contrast, the simple correlation between the relative volume of exports and foreign production by different firms in 1974, in log form as be-before, is strongly positive (.41). In a comparison across firms, factors making for a positive relationship between exports and foreign production, e.g., differences among firms in competitive power, evidently dominate.

The partial effect of foreign production on exports

Multiple regression analysis allows us to establish the partial effect of (exogenous) changes in foreign production on exports when other explanatory variables are held constant. Table 7:2 presents such regressions for cross-sections over firms. Both OLS and 2SLS estimates of the exports effects of foreign production are shown. The estimated value of foreign production ($\hat{S}_Q/S_H$), used in the 2SLS exports equation,comes from the estimates presented in Chapter 5. The only difference between the quasi-reduced form of the exports equation in Table 7:2 and the earlier reduced form is that the foreign production variable has replaced the YR variable. YR is our instrumental variable, i.e., the variable which makes the foreign production equation separately identifiable from the exports equation and allows the use of 2SLS estimation.[1]

The estimated "effect" of foreign production on exports is seen to be highly dependent on the method of estimation. According to the OLS estimate the partial effect is positive and significant and indicates that a 1 % increase in the foreign production ratio is associated with a .2 % increase in the exports ratio. (The coefficients in the log equations are elasticities.) But according to the 2SLS estimate changes in foreign production have no

[1] Cf. Appendix A.

Table 7:2 The effect of foreign production on exports overall (Cross-firm regressions)

Est. method	Dep. var.	Const.	Independent variables R&D	LS	KL	NR	SC	S_Q/S_H	DF	$\bar{R}^2$	F
OLS	S_X/S_H	-1.82	5.46	NI	NI	.90*	.15	.23***	89	.25	8.83***
			(1.63)			(1.83)	(1.50)	(3.49)			
2SLS	S_X/S_H	-2.69	7.03	NI	NI	.85	.22*	.17	88	.20	6.69***
			(1.58)			(1.54)	(1.92)	(1.32)			

NI = Not included in the regressions shown because t < 1.

The numbers in parentheses are t-values. *, **, *** indicate significance at the .10, .05 and .01 level respectively. $\bar{R}^2$ is corrected for degrees of freedom (DF).

Definitions of variables are given in Table 5:6 on p. 122.

significant effect on exports.

The same results are obtained in pooled firm and country regressions, as shown in Table 7:3. OLS estimation yields significant and positive coefficients, between .2 and .3, while 2SLS yields insignificant coefficients.

Comparing the OLS and 2SLS regressions we find, moreover, that the insignificant effect of foreign production is the only major difference between the estimates. The influence of the other variables in the regressions is about the same. The coefficients retain both their values and their significance in the 2SLS estimates. The higher explanatory power of the OLS regressions, therefore, is mainly due to the contribution of the foreign production variable.

What can we make of these results? I interpret the 2SLS estimates as showing that we have been unable to establish that foreign production has any effect on exports once we have eliminated the influence of two-way causation, i.e., the influence which runs from exports to foreign production, and of omitted variables. The OLS estimate, on the other hand, can hardly be given a causal interpretation. All we can say is that the foreign production coefficient in the OLS estimate shows influences which are not captured by the other explanatory variables in the regressions. It is, of course, possible that these influences include indirect effects of foreign production which are not captured by our regression model, e.g., effects via economies of firm size. But we cannot tell.

Since the expected effect on aggregate exports is the net effect of the opposing influences on complementary and substitute exports, it is possible that the insignificant results (in 2SLS) are due to these effects cancelling. Our next task, therefore, is to see whether we can establish a differential impact of foreign production on exports of substitute and complementary prod-

Table 7:3 The effect of foreign production on exports to different countries. All firms and firms with more than 5 manufacturing affiliates abroad 1974 (Pooled firm and country regressions.)

Est. method	Dep. var.	Const.	Independent variables R&D	LS	KL	NR	SC	GDP	GDP/cap.	TU	$\bar{w}_j/\bar{w}_H$	S_Q/S_H	DF	$\bar{R}^2$	F
All firms															
OLS	$\frac{S_X}{S_H}$	-17.77	NI	1.18**	-.27	1.15***	.32***	.32***	.54***	1.75***	NI	.29	267	.33	18.16***
				(2.10)	(1.79)	(3.24)	(3.48)	(4.62)	(3.59)	(5.85)		(6.03)			
2SLS	$\frac{S_H}{S_H}$	-19.13	NI	1.35**	-.32**	1.22***	.30***	.33***	.53***	1.75***	NI	.21	271	.25	12.66***
				(2.03)	(1.98)	(3.17)	(2.87)	(4.25)	(3.35)	(5.52)		(1.62)			
Firms with more than 5 affiliates															
OLS	$\frac{S_X}{S_H}$	-20.99	NI	4.24***	-1.54***	1.73***	.61***	.27***	.15	2.05***	.62**	.19***	160	.41	13.86***
				(4.26)	(4.83)	(3.49)	(4.67)	(3.00)	(0.55)	(5.10)	(2.09)	(2.97)			
2SLS	$\frac{S_X}{S_H}$	-28.27	-2.56	5.09***	-1.56***	1.80***	.59***	.32***	NI	2.10***	.79***	.10	161	.38	12.53***
			(1.03)	(4.07)	(4.42)	(3.47)	(4.39)	(3.67)		(5.56)	(4.33)	(0.85)			

Definitions of variables are given in Tables 5:6 on p. 122 and 5:8 on p. 134.

NI = Not included in the regressions shown because t < 1.

The numbers in parentheses are t-statistics. *, **, *** indicate significance at the .10, .05 and .01 level respectively. $\bar{R}^2$ is corrected for degrees of freedom (DF).

ucts and whether these effects, in fact, tend to cancel.

The effect on exports of substitutes and complements

There are two alternatives open to us in defining goods which are substitutes for and complementary to foreign production. One is to define parent exports of goods for further processing by the foreign affiliate as complementary exports and all other exports as net substitutes. The other is to define total parent exports to manufacturing affiliates, whether for processing or resale, as complementary and the remainder, i.e., exports to sales affiliates and to independent buyers, as net substitutes.

The first definition, clearly, is a very narrow definition of complementary products. Goods for further processing by the affiliate are indisputably complementary to the affiliate's output. Goods for resale by the manufacturing affiliate can also be complementary but need not be. In practice, they often are. Manufacturing affiliates of Swedish engineering firms, for example, often have sizeable imports from their parents of final goods, which are installed along with the products produced abroad in larger systems.[1] Prominent examples are dairy plants and industrial air conditioning systems. In general, it is unlikely that exports which are closely substitutable for the products produced abroad should be channeled through the manufacturing affiliate. (Cf. p. 195.) We therefore choose the wider definition of complementary exports, i.e., as all exports to manufacturing affiliates whether for further processing or resale. Remaining exports are defined as net substitutes,or non-complementary, since they may mainly con-

[1] Installation is not included in foreign manufacturing, as defined in this study. Installation, service and repair are activities which have to be supplied locally and which do not presume local manufacturing. They are carried out by both manufacturing and sales affiliates.

sist of goods which are independent in use..

Complementary exports according to the wider definition was only 14 % of total parent exports in 1974. However, they make up a larger fraction in countries where each parent has a manufacturing affiliate, both because intermediate goods are exported to the affiliate and because final goods are channelled through the affiliate, especially when the parent does not have sales affiliates in the same country as well.[1]

Tables 7:4 and 7:5 show what happens to the effect estimates when exports are disaggregated into substitute and complementary products in regressions across firms and in pooled firm and country regressions. Again, both 2SLS and OLS estimates are shown. We see that foreign production indeed exerts a differential impact on the two kinds of exports. In the firm cross-sections only the positive effect on complementary exports is significant in 2SLS. In the pooled firm and country cross-sections the differential impact is much more evident.

Interestingly, in Table 7:5, 2SLS estimation yields significant coefficients for foreign production with the expected sign. Although the coefficient is only just significant (at the 10 % level) in the regression on

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[1] Complementary exports will tend to be overestimated relative to non-complementary exports when the parent does not have sales affiliates in the same country, since a larger fraction of parent exports will tend to be channelled through the affiliate in such cases. (Alternatively, the latter is underestimated relative to the former when the parent does.) This will be true of relatively small exporting firms and of relatively small markets for the large exporting firms. The implied bias will, if anything, serve to weaken the expected positive relationship between foreign production and complementary exports. It would, if small exporting firms have a low propensity to produce abroad and if all firms have a low propensity to produce in small markets and if these differences are not captured by our other explanatory variables, since the hypothesis that we are testing is that the larger the relative volume of foreign production is, the larger is the relative volume of complementary exports.

Table 7:4 The effect of foreign production on exports of "substitute" and "complementary" products overall. (Cross-firm regressions)

Est. method	Dep. var.	Const.	Independent variables R&D	LS	KL	NR	SC	S_Q/S_H	DF	$\bar{R}^2$	F
OLS	$\frac{S_{XS}}{S_H}$	-1.84	3.70	NI	NI	.80	.14	.21***	88	.18	6.03***
			(1.04)			(1.53)	(1.31)	(3.01)			
2SLS	$\frac{S_{XS}}{S_H}$	-2.81	5.07	NI	NI	.74	.21*	.15	87	.14	4.72***
			(1.09)			(1.28)	(1.80)	(1.08)			
OLS	$\frac{S_{XC}}{S_H}$	-1.94	14.39***	NI	-.33	1.64**	NI	.38***	80	.28	9.31***
			(2.82)		(1.34)	(2.20)		(3.61)			
2SLS	$\frac{S_{XC}}{S_H}$	-.13	13.86**	NI	NI	1.86**	-.28	.49**	77	.24	7.30***
			(2.15)			(2.29)	(1.66)	(2.57)			

NI = Not included in the regressions shown because $t < 1$.

The numbers in parentheses are t-statistics. *, **, *** indicate significance at the .10, .05 and .01 level respectively. $\bar{R}^2$ is corrected for degrees of freedom (DF).

"Complements": S_{XC} = exports to manufacturing affiliates for resale or further processing.

"Substitutes": $S_{XS} = S_X - S_{XS}$, i.e., non-complementary exports.

Definitions of other variables are given in Table 5:6 on p. 122.

Table 7:5 The effect of foreign production on exports of "substitute" and "complementary" products to different countries (Pooled firm and country regressions.)

Est. method	Dep. var.	Const.	Independent variables R&D	LS	KL	NR	SC	GDP	GDP/Cap.	TU	$\bar{w}_j/\bar{w}_H$	S_Q/S_H	DF	$\bar{R}^2$	F
OLS	$\frac{S_{XS}}{S_H}$	-14.31	5.21*	NI	NI	1.92**	NI	.59***	.34*	2.45***	NI	NI	217	.33	18.89***
			(.177)			(5.41)		(7.00)	(1.83)	(6.63)					
2SLS	$\frac{S_{XS}}{S_H}$	-18.61	5.49*	1.34	NI	1.93***	NI	.67***	.12	2.54***	.25	.28*	216	.33	14.66***
			(1.69)	(1.37)		(5.46)		(6.95)		(6.73)	(1.07)	(1.83)			
OLS	$\frac{S_{XC}}{S_H}$	-8.75	5.68**	NI	-.50**	1.29***	.25**	NI	.63***	.88***	NI	.72***	254	.39	24.77***
			(2.43)		(2.47)	(2.67)	(2.03)		(3.39)	(2.63)		(11.37)			
2SLS	$\frac{S_{XC}}{S_H}$	-10.43	5.18*	NI	-.68***	1.41**	.26*	NI	.61***	.93**	NI	.67***	256	.13	6.70***
			(1.77)		(2.82)	(2.41)	(1.70)		(2.76)	(2.18)		(4.08)			

NI = Not included in the regressions shown because $t < 1$

The numbers in parentheses are t-statistics. *, **, *** indicate significance at the .10, .05 and .01 level respectively.

"Complements": S_{XC} = exports to manufacturing affiliates for resale or further processing.

"Substitutes": $S_X = S_X - S_{XS}$, i.e., non-complementary exports.

Definitions of the other variables are given in Tables 5:6 on p. 122 and 5:8 on p. 133.

S_{XS}/S_H, it shows that production abroad has a negative impact on exports of "substitutes", such that a 1 % increase in the relative size of foreign manufacturing causes a .3 % reduction in the relative size of exports of substitutes. The corresponding effects on exports of complements is larger, positive,and much more significant. It shows that a 1 % increase in foreign production leads to a .7 % increase in complementary exports.

Given the very wide definition of net substitutes, it is hardly surprising that the estimated substitution effect is quite weak. It is, nevertheless, noteworthy that the 2SLS estimate indicates that there is a substitution effect at all.

The strong positive effect on complementary exports both in the 2SLS and in the OLS estimates is also remarkable. It even turns out that the highly significant and positive relationship between foreign production and exports in the earlier OLS estimates of the overall effect is wholly the result of the positive relationship between foreign manufacturing and complementary exports. Exports to non-affiliated customers and to sales affiliates are unaffected by the presence of manufacturing affiliates in a country according to the OLS estimates in Table 7:5.[1]

The stronger differential impact on complementary and non-complementary exports in the cross-country regressions is probably due to the fact that foreign production (mainly) affects exports to the country of production and not to other countries. In an analysis of the firm's overall exports this effect becomes diluted and, especially in the case of the smaller in-

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1 Regressions were also run using the more narrow definition of complementary exports. They also showed a differential effect. But the difference was less marked and the explanatory value of the regressions as a whole were lower suggesting that the wider definition is the more appropriate one in our case.

vestors, possibly swamped by other influences.

In Figures 7:1 and 7:2, which show plots of complementary and non-complementary exports respectively against foreign production in different countries, we can see that the differential effect that we have estimated in the multiple regressions corresponds to distinct differences in the simple relationships between these variables. Zero export values are also plotted, even though they are not included in the regressions, and appear as a band along the foreign production axis at a very low value of the exports ratio.[1] The simple correlation coefficients are .56 for "complements" and .03 for "substitutes" (excluding zero values). The corresponding plots against the estimated value of foreign production, not presented, show much less variation in foreign production and much

[1] At this point we should mention a technical fact which affects the estimates and also illustrates the sensitivity of the results to the range of data points included in the analysis. A number of observations (approximately 50 in each have been excluded from the cross-country regressions because the dependent variable was zero, which, of course, becomes an infinitely large negative number in log form. On a priori grounds, zero exports should be included as well as near zero exports (relative to home sales). However, regardless of which way one attempts to deal with these observations here, an element of arbitrariness enters the analysis and the results are changed. (Adding a constant to the exports and foreign production ratios, e.g., $(S_X/S_H)+1$, alters the relationship between the non-zero values. Setting zero values of the exports ratio equal to a low positive number gives these observations a very heavy weight, which strongly affects the estimated relationships. The extent to which they affect the estimates in the latter case, of course, depends on which value one assigns these observations.) We have chosen to omit them and, in so doing, assume that zero values can be represented by near-zero values of the exports ratio. (We have made an analoguous choice in not including Swedish firms which do not have foreign production and in not including countries in which firms do not produce.)

Although this seems the preferable method for the purpose of ascertaining the partial relationship between producing in and exporting to a country, it does change the influence of some of the other variables in the equations. The positive influence of R&D intensity and the reduced influence of skill intensity in Table 7:5 compared to in Table 7:3 can to some extent be traced to the characteristics of the excluded observations. Quite often, particularly in the non-complementary exports equations, the excluded firms are relatively small firms with a low propensity to export in general and characterized by a low R&D and skill intensity. Yet, the influence of the other variables is changed less with the method chosen than one where the zero observations are given the weight illustrated in Figures 7:1 and 7:2.

less of a relationship between the plotted variables. The simple correlation is also 50 % lower.

Returning to Table 7:5, we may also note that while demand characteristics such as foreign market size (GDP) and EFTA membership (TU) are important determinants of differences in non-complementary exports, they have no influence on complementary exports. In the equations for the latter, the relative volume of foreign production appears to be the relevant demand factor instead.[1] The estimated value of foreign production in the 2SLS regression is much less significant in this role than the actual value in the OLS regression, which accounts for the much lower explanatory power of the former. A possible reason is that the foreign production variable has been poorly estimated. Another reason may be that the OLS estimates actually capture certain "effects" of foreign production, which our 2SLS equations do not.

As noted earlier, the foreign production variable in the OLS regressions probably, in part, reflects the influence of omitted variables. It can be argued that some of these omitted variables are ones that are relevant to an assessment of the effect of constraints on foreign production. Examples are host country trade policy creating "complementarity" between exports and foreign production or effects on foreign demand of a local presence, neither of which are captured by our estimating equations. Before dismissing the highly significant OLS estimates, we therefore need to compare the results obtained by the different methods further. As we have seen, it is not a matter of indifference whether one accepts the OLS or 2SLS estimates of the effects of foreign production on exports, a finding which calls into question the results obtained in earlier single-equation studies.

[1] Recall that foreign production is defined net of imports from parents, so there is no definitional relationship between the two variables.

Figure 7:1 Scatter diagram of the propensity to export non-complementary products against the propensity to produce in different countries (logarithmic values)

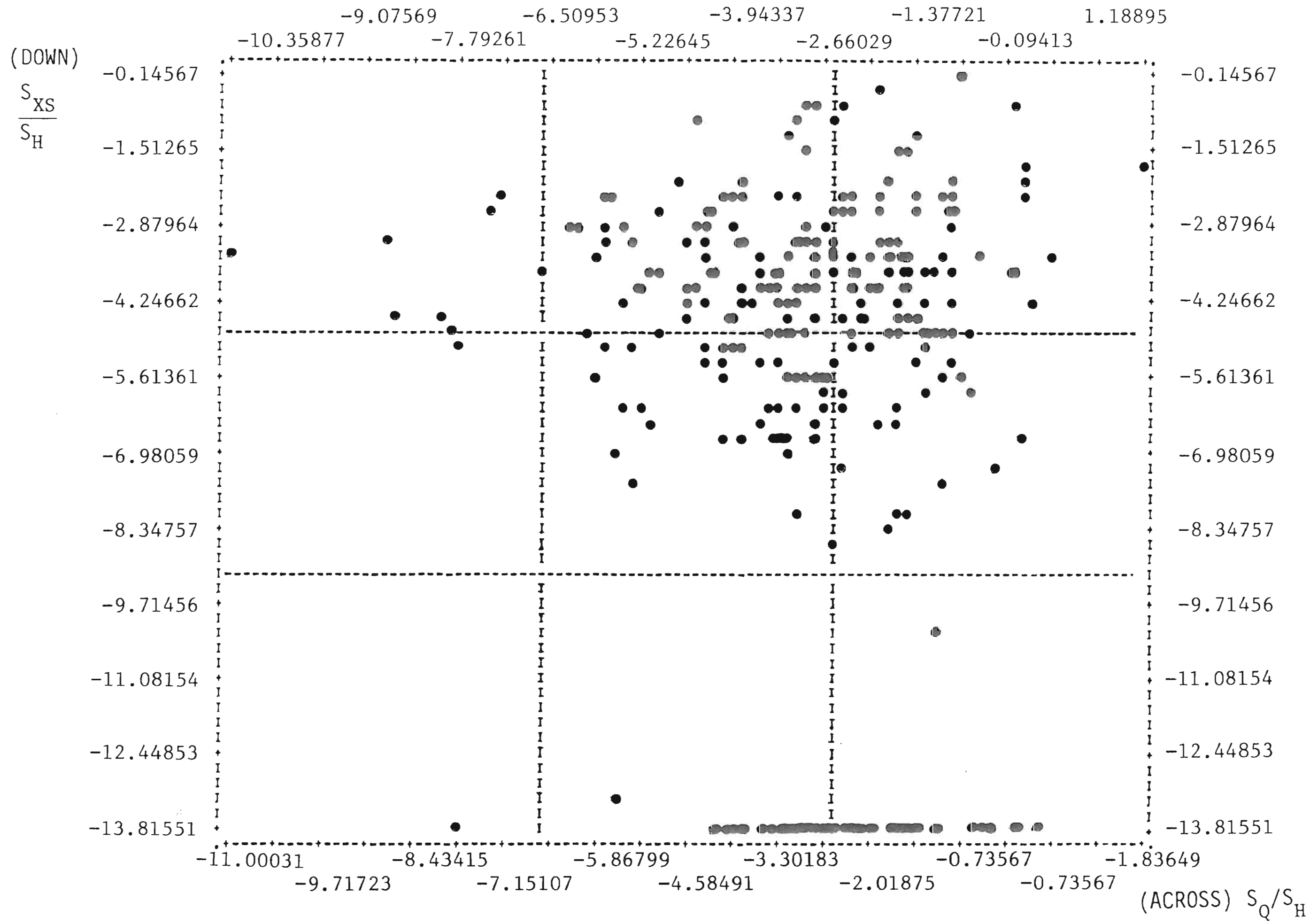
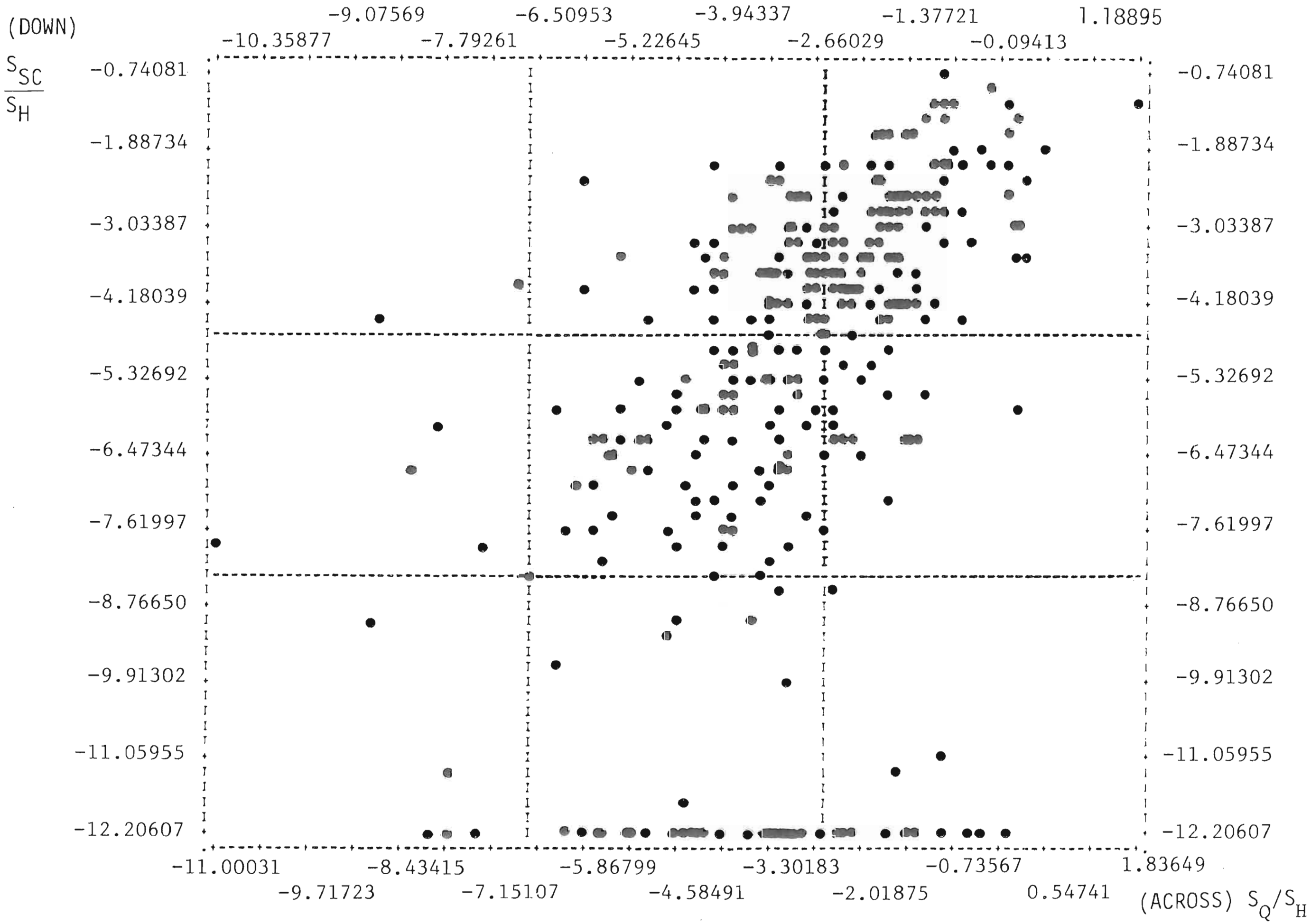


Figure 7:2 Scatter diagram of the propensity to export complementary products against the propensity to produce in different countries (logarithmic values)



Comparisons of the different estimates

Table 7:6 summarizes the results in this chapter and also presents the estimated effects in terms of absolute values, a form which is intuitively easier to grasp. Thus, along with the estimated elasticities of the exports ratio with respect to the foreign production ratio we show the change in the different kinds of exports which follows from a unit change in the volume of foreign production. It allows us to compare the effect of a 1 dollar increase in foreign production on total exports with the effect on complementary and non-complementary exports.

Absolute values are obtained by multiplying the export elasticity by the size of the export ratio relative to the size of the foreign production ratio, i.e., by $\frac{S_X}{S_H} / \frac{S_Q}{S_H}$.[1] Since the export effects are not linear functions of the volume of foreign production, the calculated effects only hold for the particular value for which they have been calculated. Table 7:6 shows how large these effects are when the export and foreign production ratios are equal to their mean values.

Both OLS and 2SLS estimates are shown. Thus, we can again compare the rather large positive effects obtained in the OLS estimates with the relatively modest ones from the 2SLS estimates. According to the latter, a 1 dollar increase in foreign production leads to an increase in complementary exports overall of 10 cents. Although there is no offsetting negative effect on non-complementary exports, this effect does not show up in total exports. Evidently, it is not strong enough to do so, given that complementary exports are such a small fraction of total exports.

The effect on complementary exports to countries in which the firm actually has manufacturing is somewhat larger, 15 cents. It is partly off-

[1] From the function $y = \alpha_0 x^{\alpha_1}$ we have $\alpha_1 = \frac{dy}{y} / \frac{dx}{x}$ and $\alpha_1 \frac{y}{x} = \frac{dy}{dx}$. The conversion in our case requires that S_H is constant.

Table 7:6 The estimated effects of a 1 dollar increase in foreign production on the average firm's own exports overall and to individual countries

Variable	Mean value	Elasticity[a]		Derivative[b]	
		OLS	2SLS	OLS	2SLS
Overall:					
S_Q/S_H	.2187				
S_X/S_H	.6065	.23	n.s.	.64	n.s.
S_{XS}/S_H	.4966	.21	n.s.	.48	n.s.
S_{XC}/S_H	.0429	.38	.49	.08	.10
To individual countries:					
S_Q/S_H	.0523				
S_X/S_H	.0373	.29	n.s.	.20	n.s.
S_{XS}/S_H	.0172	n.s.	-.28	n.s.	-.09
S_{XC}/S_H	.0113	.72	.67	.16	.15

[a] Equals the regression coefficients in Tables 7:4 and 7:5. Only significant coefficients are shown.

[b] Estimated at mean value.

n.s. = not significant.

set by a negative effect on non-complementary exports of 9 cents. Although the net effect of these opposing influences is positive on average, it is not very large and the estimated effect on total exports shows that it is not significantly different from zero.

By contrast, the OLS estimates of the overall effect on exports of foreign production, seem unreasonable. They show that the positive effect on total exports comes mainly from increased non-complementary exports. It also shows that this effect is stronger on aggregate exports than on exports to countries in which there is manufacturing. This result, clearly, runs counter to a priori considerations, which suggest that the positive effect on total exports should appear mainly in the form of increased complementary exports and should, furthermore, be most visible in exports to countries in which the firm actually produces.

To conclude, our empirical analysis shows that the choice of estimating technique does affect the estimates. It confirms our a priori expectation that 2SLS estimation is preferable to OLS for an analysis of the effects of allowing foreign production on exports, even though the former, in our case, probably does not capture all effects of foreign production. The results show also that changes in foreign production have a significant effect on exports. The positive effect on complementary exports exceeds the negative effect on non-complementary exports, suggesting that the net effect of an increase in foreign production on the firm's total exports is positive on average.

In addition to the effects indicated by the foregoing analysis account should be taken of the indirect effects of foreign production on the firm's competitive power due to economies of firm size. Such effects, which are not captured by our estimates, may be quite important in practice, perhaps especially to firms operating from a small home base, as Swedish firms do. Multinational operations have meant that many Swedish firms have been able to grow considerably larger than they would have if they had been confined to domestic production, and there is no doubt that advantages of firm size contribute to the current export prowess of many of them. However, these effects are likely to be more important in a longer time perspective. For marginal changes in foreign production they are probably not very large relative to the ones we have estimated, although they should enhance somewhat the positive effect that we have found on the firm's exports.

7.6 Related studies on the exports effects of U.S. direct investment

There have been a host of empirical studies dealing with the exports effects of foreign manufacturing.[1] Here we will focus only on the following econometric studies, namely, one by Horst [1974] and two by Lipsey and Weiss [1976], because they are similar to the present one and the results, therefore, readily comparable with one another. They are among the very few studies which attempt to determine the partial effect of foreign production, while holding constant other factors (firm, industry and country characteristics) simultaneously affecting both.[2]

A number of other studies, e.g., Business International [1970] and the U.S. Tariff Commission [1973] have drawn conclusions about the effect of foreign production on exports merely by comparing the superior export performance of multinational firms relative to that of non-multinational firms, without regard to other determinants of such differences - what Horst [ibid] terms the post-hoc-ergo-propter hoc fallacy. Others, e.g., Reddaway [ibid] and Stobaugh and Associates [1972], calculate the effects of

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[1] For an excellent survey and appraisal of the earlier literature, see Horst [1974].

[2] Another study, which deserves mention for the same reason, is the one by Tell [1976]. Tell uses a variant of the constant market share method and analyzes the change in U.S. shares in foreign markets which are due to changes in foreign production by U.S. firms. Tell's effect estimates are not as readily comparable with our own, but they suggest, as do ours, that the exports effect has been positive.

foreign production on the basis of what they consider likely, but which are nevertheless untested, assumptions regarding what the alternative to foreign investment by U.K. or U.S. firms is. This accounts for the widely different estimates of exports effects produced by these studies. For example, Stobaugh *et al*. estimate that foreign production by U.S. multinationals have created 600,000 new jobs in the U.S., while the Tariff Commission estimates that it has meant a loss of 1.3 million job opportunities.

Horst [ibid] proceeds in a way very similar to our own. In cross-sections over industries and countries he first investigates the determinants of U.S. exports and of foreign production, each normalized for the volume of domestic sales. He finds that both may be explained by the same set of factors. (The explanatory value in both regressions is around .40.) Then he moves the foreign production ratio to the right hand side of the regression for the exports ratio and states that this will show whether the partial relationship between American exports and subsidiary net sales is positive or negative. If the former, it would be evidence of net complementarity between exports and foreign production by U.S. firms. If the latter, it would show that the net effect is one of substitution. Horst finds a highly significant positive relationship between the two, which tapers off and becomes negative for very large volumes of foreign production relative to domestic sales. Only 4 out of 184 observations were in the range where foreign production had a negative effect on exports, however.

Lipsey and Weiss [1976], in a far more ambitious and detailed statistical study, analyze the relationship between exports and foreign production by U.S. firms in cross-sections over countries as well as over companies. Industry exports to a cross-section of 44 countries are related to country characteristics (GDP, EEC membership and a proxy for transportation costs) and to the level of U.S. owned manufacturing affiliates' activity in the country. The most important missing variable which affects both exports and foreign production, they suspect, is host country trade policy. This omission should bias their results toward showing substitution between exports and foreign production.

Yet, they, too, find a significant positive relationship between exports and foreign production in country-cross-sections for 14 industries and in company cross-sections for 8 regions. The consistency of the results, the separate significance of the country characteristics,as well as the fact that foreign production by U.S. firms had a negative effect on exports by a group of other industrial countries led them to conclude that this positive relationship represented the effect of foreign production by U.S. firms on U.S. exports rather than a disguised influence of country characteristics on both of these. Broadly the same results were obtained in a separate study of the pharmaceutical industry [1976].

There is very little indication of a substitutional relationship between exports and foreign production in the Lipsey and Weiss studies. In the pharmaceutical industry study the results show that foreign production has a larger positive effect on exports of intermediate products (bulk pharmaceuticals) than on exports of final products (packaged pharmaceuticals). Although there is some substitution between the two kinds of exports, both effects are positive.

The size of the estimated effects in the studies of both Horst and Lipsey and Weiss are in the same range as those obtained for Swedish firms in the pooled data. Lipsey and Weiss find that the effect of a 1 dollar increase in foreign production on parent exports to an area ranges between 1-15 cents, depending on the industry, except in the non-electrical machinery industry where it is as high as 25 cents. Horst's estimates indicate that the average effect for all industries is 3-10 cents (in the range where there is a positive relationship and where most firms are found). These numbers are generally lower than the ones obtained by OLS on the Swedish data but higher than the ones obtained by 2SLS.

Both Horst and Lipsey and Weiss use only OLS to estimate the partial effect of foreign production. Whether the positive effects obtained in their studies would have been lower or a substitutional relationship more in evidence, if 2SLS estimation had been used, is an open question. The Swedish analysis suggests that it would.

Otherwise, the results of the U.S. and Swedish studies are rather similar. They all suggest that an increase in foreign production has a relatively modest, positive effect on overall exports from the investing country.

The net complementarity between foreign production and exporting, Horst observes, has important implications for economic theory. In his words:

> ".... it suggests that the conventional general equilibrium theory with its assumptions of free flows of information, exogenously given demand for homogeneous products and anonymous, atomistic firms is fundamentally misleading. Whether complementarities are based on the parent and subsidiary sharing common information about new markets, joint distributional, credit or service facilities, or a single brand name and company reputation, the common asset is a firm-specific resource. It belongs to the firm alone and is not typically shared with competitors, American or foreign. Multinational firms are something more than an anonymous agent combining homogeneous labor and capital to produce homogeneous products, and their heterogeneity has a real, measurable impact on American export and investment patterns." (ibid. p. 84).

This conclusion is correct in the following sense. If markets were perfectly compatitive, so that all firms faced a perfectly elastic demand for their products, there would be no effect of foreign production on the investing firm's exports, since foreign production would have no effect on price. Indeed, the theory in Chapter 2 suggests that, under these conditions, there would be no foreign production by multinational companies.

On the other hand, the failure to establish a clear substitution effect in the Lipsey and Weiss studies can also support the opposite conclusion. If their results (as well as our own) are interpreted to show that the substitution effect of foreign production is, in fact, negligible, and not the result of inadequate analytical methods, it would be confirmation of the much debated assumptions originally made by Reddaway [ibid] regarding the "alternative position". It would, in other words, suggest that the alternative to foreign production by U.S. (U.K. or Swedish) firms would be much the same production by non-U.S. (non-U.K. or non-Swedish) firms and, hence, the substitution of foreign production for exports would have occurred in any case. The conclusion for economic theory of this finding is that foreign investors operate in a highly competitive environment, where the final output of one firm is highly substitutable for that of another firm, and where failure by one firm to establish production in another country will immediately cause another firm to produce the same output, in the same quantity as the first firm would have.

It is not an easy issue to settle. However, I believe, and our own results suggest it, that the conclusion implied by the absence of a substitution effect is exaggerated. It is more likely that the substitutional effects have been underestimated, and the positive net effect overestimated, in the studies discussed here.

7.7 Summary and conclusions

The question of whether foreign production by national firms implies increased or decreased exports from the investing country is one which has a long history of public debate. Horst [ibid] reminds us that it was an issue in the public policy debate in the U.S. already in the 1920's. Then, as well as in the contemporary debate, organized labor has charged, and the business community vehemently denied, that foreign production replaces exports, or increases imports, and threatens production and job opportunities at home. Academic economists have found themselves in the middle of the barrage, pointing out that there are "effects" in both directions and that the issue cannot be settled on *a priori* grounds.

The foregoing analysis has tried to settle the issue on empirical grounds using data for Swedish firms. The regression results, which should be interpreted as showing the effect of allowing firms to produce abroad or of relaxing controls on foreign production, show that there is indeed a highly significant and positive effect on exports of goods which are complementary to foreign manufacturing by Swedish firms. Our estimates show that there is also a negative effect on exports which are non-complementary to foreign manufacturing, but this effect is not as large, nor as significant, as the positive effect. One reason that the substitution effect is less unambiguous than the complementarity effect is probably that our definition of substitutes is so wide.

The net effect of these opposing influences is a very small positive effect on the firm's exports to countries where they have manufacturing affiliates. For the average firm, this effect is probably not larger than 6 cents for every 1 dollar increase in foreign production and it may be closer to zero.

To the above effects should be added the potentially positive effect on the firm's general competitiveness due to economies of larger firm size. Although we have not been able to quantify such indirect benefits of foreign expansion, it seems likely that they exist and, in a longer time perspective, are quite important.

But what, one might wonder, was all the political controversy about when the effects are so small? Much of it was due to uncertainty regarding the alternative to foreign production and the extent to which foreign markets could have been served through exports. Our results indicate that they could not have been so served, that without foreign production these markets would, largely, have been lost to the firm. By producing abroad firms not only gain in foreign market shares but actually succeed in exporting somewhat more than they would have if they had not located abroad.

The contribution of the present study to a literature that has been growing rapidly over the last decade is that it supports conclusions regarding the exports effect of allowing foreign production with careful empirical evidence. It is one of only a few studies which presents evidence on the partial effect of foreign production on the exports of the investing firms, i.e., the effect which is due to foreign production and not to a host of other factors which also affect exports.

Increased exports is not, of course, a goal in itself. Effects on the level and the distribution of income in the home country are the ultimate, though not the only, standards by which to judge the welfare effects of the multinational operations of national firms. A positive net effect on the investing firm's exports contributes, however, to improved employment opportunities and incomes of individuals in those firms. Enhanced competitiveness via benefits of firm size may increase future growth and, hence, yield further benefits over time.

Our results, in sum, remove at least some of the stated reasons for broad interference with the free movement of direct investment capital provided for under the current Swedish foreign exchange regulations. In the next section we shall see that these conclusions are not altered when we take account of the repercussions in the rest of the economy.

7.8 Macroeconomic implications

The relationship between the partial effects on exports of foreign production controls estimated in this chapter and the effects of international investment discussed in Chapter 2 in the general equilibrium framework of the pure theory of international trade needs to be clarified. At the same time we will state what macroeconomic implications can be drawn from the findings in this chapter.

In the pure theory of international trade and investment international investment is seen as a flow of real capital, i.e., physical capital equipment. In reality, international investment is, of course, a flow of financial capital, i.e., a monetary transfer.

The monetary transfer will, under certain circumstances, be matched by an outflow of real resources, however, in which case the effects on the investing and recipient countries will be those predicted by trade theory. For this to happen it is necessary that the automatic adjustments to a monetary outflow are allowed to work themselves out. Depreciation of the investing country's currency or deflation of its price level will then lead to an increase in exports and a decrease in imports. The export surplus constitutes the real resource transfer between the investing and recipient country, which, if it is matched by a change in capital formation in these countries, corresponds to the real capital export in trade theory.

The relocation of real capital ensures, given the assumptions of the model, that real income in both countries will be raised, that the return to capital in the investing country will rise and the return to labor (and other cooperating factors) will fall and that the opposite changes in relative factor returns will take place in the recipient country. (Cf. Chapter 2.)

In practice, countries can and do avoid adjusting to a balance of payments deficit due to a net outflow of investment capital, e.g., by reducing their international reserves or by foreign borrowing. Sooner or later reserves have to be restored (if the original level was optimal) and foreign debts repaid. But by then the original capital outflow may have generated an offsetting inflow of repatriated earnings - thereby obviating any need for adjustment. Without adjustment and the consequent export surplus and change in capital formation international investment has - according to neoclassical trade theory - no effect on either the investing or the recipient country.

However, as we have shown (empirically) in Chapter 7 and (theoretically) in Appendix A, international production can have an effect on the exports of the investing firm. These effects are independent of any aggregate adjustment to the investment outflow and depend on the presence of certain market imperfections: a negatively sloped demand curve for the firm in foreign markets, government intervention or costs preventing the free flow of information. Each of these violates the assumptions on which the predictions - and welfare implications - of the pure theory of international trade is based.

If the net effect on the investing firm's exports is not completely offset by opposite changes elsewhere in the investing country, it will affect the balance of payments gap caused by the investment outflow. Thus, the pressure to depreciate will, ceteris paribus, be less if the net effect is positive and it will be greater if this effect is negative.

Our results indicate that there is a small positive effect on the exports of investing firms from allowing foreign production. But what can we say about the effects in the aggregate? Is this positive effect on exports accompanied by offsetting changes elsewhere? More importantly, what can we say about changes in resource allocation and relative factor demands?

There are two kinds of changes to consider. First, there are those that arise because there may be a substitute or complementary relationship between foreign production and the exports of non-foreign investors. With differentiated products and vertically integrated firms, such effects are likely to be quite small relative to the ones we have estimated. Although the net impact is uncertain a priori, one could argue, in the case of Swedish firms, that the complementarity effect probably outweighs the substitution effect. The number of domestic producers of close substitutes is very small in most industries, due to the smallness of the Swedish market, while the reliance on independent suppliers (some of whom are domestic) of intermediate products can be extensive.[1]

Second, given full employment in the investing country, the domestic output growth of foreign investors with increased demand for exports affects the output of non-investing firms via factor markets. Investors will bid resources away from non-investors, forcing the latter to contract. The non-

[1] Information on foreign affiliates' imports from non-affiliated firms in Sweden in 1970 indicates that such imports are negligible compared to imports from the parent groups, however.

investors likely to be most affected as factor prices are bid up are marginal producers in import competing industries (or in the non-traded goods sector). Hence, foreign production should imply some reduction of output in these industries and an increased demand for imports. The net effect on the balance of trade of increased exports by foreign investors, on the one hand, and decreased output in the import competing industries, on the other, is, again, uncertain *a priori*. Nor is this question of fundamental import, as noted earlier, since a trade surplus is not an objective in itself.

Increased exports - possibly accompanied by increased imports - implies increased specialization between countries in accordance with the comparative advantage of each. This implies an increase in national income. It also implies an increased demand for factors of production used relatively intensively in the export industries and a decreased demand for factors used relatively intensively in the import competing industries. Relative factor returns should be altered accordingly. This should be the *direction* of change. The actual impact on resource allocation and factor returns may be negligible, at least in the short run.

In sum, direct investment - or, more accurately, foreign production by home firms - can have an impact on resource allocation and, hence, on aggregate income and the distribution of income in the investing country even when the capital outflow itself does not lead to an international transfer of real resources. The reason is found in the interrelationship between foreign and domestic production by national firms. Furthermore, we can say something about the likely direction - if not the size - of these changes in the aggregate:

Factors of production used relatively intensively in the export industries will gain relative to those used relatively intensively in the import competing industries. The result should be an increase in national income. The predicted effects on welfare of allowing foreign production, therefore, are completely analogous to those that would follow from allowing freer trade.

Appendix A

Supplement to Chapter 4 and Chapter 7

A.1 The model in reduced form

The theoretical model presented in Chapter 4 leads up to three equations, which together determine the optimal volume of home production (Q_H), exports (S_X) and foreign production (Q_A) for a profit-maximizing, single-product firm. Here we will show explicitly how the model can be solved to yield the kind of estimating equations used in the empirical analysis in subsequent chapters.

To facilitate solving the model presented in Chapter 4 we assume the following linear price and quadratic cost functions.[1]

$$P_H = \alpha_H + \frac{\beta_H}{2} (Q_H - S_X) \tag{A:1}$$

$$P_A = \alpha_A + \frac{\beta_A}{2} (Q_A + S_X) \tag{A:2}$$

$$C_H = \gamma_H Q_H + \frac{\delta_H}{2} Q_H^2 \tag{A:3}$$

$$C_A = \gamma_A Q_A + \frac{\delta_A}{2} Q_A^2 \tag{A:4}$$

where $Q_H - S_X$ = home sales

$Q_A + S_X$ = total foreign sales.

[1] This model can be thought of as a linearized version of the one in Chapter 4, which is linear in logarithmic form.

The profit function is then

$$\pi = P_H(Q_H-S_X) + P_A(Q_A+S_X) - C_H - C_A \tag{A:5}$$

so profit maximization implies

$$\frac{\delta\pi}{\delta Q_H} = \beta_H(Q_H-S_X) + \alpha_H - \gamma_H - \delta_H Q_H = 0 \tag{A:6}$$

$$\frac{\delta\pi}{\delta Q_A} = \beta_A(Q_A+S_X) + \alpha_A - \gamma_A - \delta_A Q_A = 0 \tag{A:7}$$

$$\frac{\delta\pi}{\delta S_X} = -\beta_H(Q_H-S_X) - \alpha_H + \beta_A(Q_A+S_X) + \alpha_A = 0 \tag{A:8}$$

Equations (A:6)-(A:8), which correspond to equations (4:7)-(4:9) in Chapter 4, define a model of the determinants of Q_H, Q_A and S_X. These equations contain endogenous variables and structural parameters, the latter being the intercept and slope of the demand and marginal cost functions at home and abroad, but no exogenous variables. As noted in Chapter 4, exogenous variables affect these parameters and we now bring them explicitly into the model in order to solve the model with respect to these variables.

We assume that exogenous variables affect the intercepts (α_H, α_A, γ_H, γ_A) but not the slopes (β_H, β_A, δ_H, δ_A) of the demand and marginal cost functions. We also make the further simplifying assumption that the intercepts are linear functions of the exogenous variables, thereby keeping the whole model linear.

Let us rewrite (A:6)-(A:8) in matrix notation as follows

$$\begin{bmatrix} \beta_H - \delta_H & 0 & -\beta_H \\ 0 & \beta_A - \delta_A & \beta_A \\ -\beta_H & \beta_A & \beta_H + \beta_A \end{bmatrix} \begin{bmatrix} Q_H \\ Q_A \\ S_X \end{bmatrix} = \begin{bmatrix} \gamma_H \\ \gamma_A \\ \alpha_H \end{bmatrix} + \begin{bmatrix} -\alpha_H \\ -\alpha_A \\ -\alpha_A \end{bmatrix} \tag{A:9}$$

Denoting the matrix of structural coefficients by A, the vector of endogenous variables by Y and the two vectors of intercepts on the right by X_1 and X_2 respectively, we rewrite (A:9) more compactly

$$AY = X_1 + X_2 \tag{A:9'}$$

Then, by our above assumption

$$X_1 = B_1 Z \tag{A:10}$$

$$X_2 = B_2 Z \tag{A:11}$$

where Z is the vector of exogenous variables discussed in Chapter 4 (R&D, LS, KL, etc) and B_1 an. .re the matrices of their coefficients.

Equations (A:9) - (A:11) define the whole model in structural form. We can now solve it so that each endogenous variable is a function of the exogenous variables only. First, we substitute (A:10) and (A:11) into A:9')

$$AY = B_1 Z + B_2 Z \tag{A:12}$$

Then, using Cramer's rule, we premultiply both sides in (A:12) by the inverse matrix A^{-1}

$$Y = A^{-1}(B_1+B_2)Z \tag{A:13}$$

which is the reduced form. $A^{-1}(B_1+B_2)$ is the matrix of reduced-form coefficients, which we estimate in our regression equations as

$$Y = CZ \tag{A:13'}$$

where c_{ij} in C are the regression coefficients.

From the estimated coefficients in the C-matrix it might be possible to identify all the structural coefficients in the A, B_1 and B_2 matrices, in which case we could indirectly estimate these coefficients from the regression equations. Identification requires that the structural equations are exactly identified with respect to the reduced-form coefficients. This, in turn, requires a number of *a priori* restrictions on the structural model, e.g., that some of the coefficients in the structural model are set equal to zero.

Since, in this study, we are not trying to determine the values of the structural parameters in the underlying model (the revenue and cost functions), the question of theoretical and empirical identification of these parameters will not be investigated here. Only in the next section will it be raised in the specific context of estimating the effect of foreign production controls on exports by "quasi-reduced-form" equations.

A.2 Theoretical issues relating to the effect of controls on foreign production

The problem addressed in Chapter 7, i.e., the determination of the partial effect on exports of controls on foreign production, raises two questions:

(1) can the coefficient for foreign production in an equation where exports is the dependent variable be interpreted as showing the effect on exports of controlling foreign production, and

(2) are the structural equations for the endogenous variables, exports and foreign production, identifiable in terms of the exogenous variables?

"The effect of a change in an endogenous variable"

An endogenous variable only changes when one of the exogenous variables in the system changes. The changes in the other endogenous variables accompanying this change will differ depending on which exogenous variable caused the endogenous variables to change. It follows that one cannot speak of "the effect of a change in an endogenous variable".

However, when, as in our case, variation in the level of foreign production is viewed as a policy parameter, foreign production ceases to be an endogenous variable. Controls on foreign production mean that Q_A cannot be adjusted, so equation (A:7), which states that foreign production should be such that $MR_A = MC_A$, becomes irrelevant and we are left with only two equilibrium conditions, namely, that domestic production and exports should adjust so that $MR_H = MC_H$ and $MR_H = MR_A$.

How do we determine the effect of exogenous changes in Q_A? Our model is now

$$\begin{bmatrix} \beta_H - \delta_H & -\beta_H \\ -\beta_H & \beta_H + \beta_A \end{bmatrix} \begin{bmatrix} Q_H \\ S_X \end{bmatrix} = \begin{bmatrix} 0 \\ -\beta_A \end{bmatrix} \bar{Q}_A + \begin{bmatrix} \cdot \\ \cdot \end{bmatrix} Z \qquad \text{(A:14)}$$

which can be rewritten in reduced form as

$$\begin{bmatrix} Q_H \\ S_X \end{bmatrix} = (\det)^{-1} \begin{bmatrix} \beta_H + \beta_A & \beta_H \\ \beta_H & \beta_H - \delta_H \end{bmatrix} = \begin{bmatrix} 0 \\ -\beta_A \end{bmatrix} \bar{Q}_A + \begin{bmatrix} \cdot \\ \cdot \end{bmatrix} Z \qquad (A:15)$$

where det = $\beta_H\beta_A - \delta_H(\beta_H+\beta_A)$ is the determinant of (A:14).

Differentiation yields

$$\frac{dQ_H}{d\bar{Q}_A} = -\beta_A\beta_H/[\beta_A\beta_H - \delta_H(\beta_H+\beta_A)] \qquad (A:16)$$

$$\frac{dS_X}{d\bar{Q}_A} = -\beta_A(\beta_H-\delta_H)/[\beta_A\beta_H - \delta_H(\beta_H+\beta_A)] \qquad (A:17)$$

Thus, the partial effect on Q_H and S_X of relaxing controls on foreign production is given by the coefficient of $\bar{Q}_A$ in the respective reduced-form equations - or "quasi-reduced-form" equations, since $\bar{Q}_A$ is left as an explanatory variable in both.[1]

According to (A:16) and (A:17) both effects are negative, since det > 0 (2nd order condition) and $-\beta_A\beta_H < 0$ and $-\beta_A(\beta_H-\delta_H) < 0$ ($\beta_H,\beta_A < 0$ being the slope of the average revenue curve and $\delta_H > 0$ being the slope of the marginal cost curve). The negative effect on exports is larger than the negative effect on home production and exceeds the latter by the term $\frac{\beta_A\delta_H}{\det}$.

In this model, therefore, the partial effect of exogenous changes in $\bar{Q}_A$ is seen to depend only on the slope of the home and foreign average revenue functions (β_H,β_A) and on the slope of the home marginal cost

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[1] The total derivatives - (A:16) and (A:17) - can be contrasted with the "apparent derivatives" in each structural equation [e.g., $(dS_X)/(d\bar{Q}_A)$ in equation (A:20) below which is $(\beta_A)/(\beta_H+\beta_A)$]. The difference is that the $\bar{Q}_A$ coefficients in the reduced-form equations take account of the feedback between the endogenous variables in the simultaneous-equations system, which the "apparent derivatives" in the structural equations do not.

function (δ_H). In the expanded model to be presented in the next section, additional factors are involved and the net effect of $d\bar{Q}_A$ is indeterminate *a priori*.

Clearly, if we had been interested in the values of the structural parameters *per se*, and had estimated them separately, we could have inferred the effect of relaxing controls on Q_A from these parameter values. However, we have not done so. Instead, we have, in Chapter 7, estimated the coefficient on $\bar{Q}_A$ in the quasi-reduced form directly. The result should be the same.

Identification and estimation

In Chapter 7 we address the hypothetical question of what *would be* the effect of foreign production controls. In reality, what we observe in the data are endogenous adjustments of the level of foreign production.

In order to estimate the effect on exports (or home production) of hypothetical foreign production controls it is essential that the foreign production variable enters the estimating equations as an exogenous variable. This is where estimation by two-stage-least-squares (2SLS) comes in. The estimated value of an endogenous variable, which is used instead of the actual value in the second step of 2SLS-estimation, becomes an exogenous variable in the model. It is purged of feed-back effects between the endogenous variables and its coefficient can be interpreted as showing the partial effect of changes in this variable.

The use of 2SLS requires that the structural equation for Q_A contains exogenous variables whose coefficients may be set equal to zero in the Q_H and S_X equations. This is sufficient to ensure that the coefficients in the equation on Q_A, which is estimated in the first step, identify the coefficient on Q_A in the Q_H and S_X equations, which are estimated in the second step.

To see this we go back to our original equations (A:6)-(A:8) and rewrite them as structural equations:

$$Q_H = \frac{1}{\beta_H - \delta_H} (\beta_H S_X - \alpha_H + \gamma_H) \tag{A:18}$$

$$Q_A = \frac{1}{\beta_A - \delta_A} (-\beta_A S_X - \alpha_A + \gamma_A) \tag{A:19}$$

$$S_X = \frac{1}{\beta_H + \beta_A} (\alpha_H - \alpha_A + \beta_H Q_H - \beta_A Q_A) \tag{A:20}$$

Rewriting these equations to express Q_H and S_X as functions of Q_A only yields the quasi-reduced-form equations used for estimation:

$$Q_H = \frac{1}{\beta_H \beta_A - \delta_H(\beta_H + \beta_A)} \{-\beta_A \beta_H Q_A + (\beta_H + \beta_A) \gamma_H - \beta_A \alpha_H - \beta_H \alpha_A\} \tag{A:18'}$$

$$S_X = \frac{1}{\beta_H \beta_A - \delta_H(\beta_H + \beta_A)} \{-\beta_A(\beta_H - \delta_H) Q_A + \beta_H(\gamma_H - \alpha_A) + \delta_H(\alpha_A - \alpha_H)\} \tag{A:20'}$$

We want to use the second structural equation - (A:19) - to identify the coefficients on Q_A in (A:18') and (A:20'). The system is seen to be identified and estimable by 2SLS. Only (A:19) contains parameters from the foreign cost function (γ_A). Therefore, factors uniquely affecting foreign costs identify the coefficient on Q_A in (A:18') and (A:20').

In Chapter 4 we argue that the age of the firm's foreign operations, YR, is a variable which will affect Q_A by, inter alia, reducing foreign costs. The reason is that learning-by-doing increases the productivity of foreign factors of production over time.

YR is used as an instrumental variable in the empirical analysis, because it affects costs abroad and not costs at home nor demand, i.e., γ_A but not α_H, γ_H and α_A in equations (A:18') and (A:20'). (Of course, foreign demand might be affected by the length of time the firm has been selling in foreign markets, but this is normally related to how long the firm has been exporting rather than to how long it has been producing abroad.) The YR variable, then, allows us to say that in estimating the effect of foreign production controls in Chapter 7 we estimate, in principle, equation (A:20') above. The "in principle", of course, is to safeguard against the fact that there is a very crude correspondence between the theoretical variables in the structural equation and the empirical variables in the estimating equations.

A.3 A model of foreign production and exports with complementarity and substitution effects

The empirical analysis of the interrelationship between exports and foreign production in Chapter 7 is based on a theoretical model, which allows for both complementarity and substitution between exports and foreign production. The model presented here captures some of the main features.

We introduce the following new notation:

Q_H = home production of final product

S = exports of home produced final product

Y = exports of intermediate product

Q_A = production of final product abroad

We assume that the firm produces both intermediate and final products at home but sells only the final product in the home market. Both intermediate and final products are exported, the former to foreign manufacturing affiliates for further processing abroad, the latter to outside buyers. When intermediate products go into home sales or exports of final product, they are part of Q_H. When they are exported, we call them Y. Increased production of intermediate goods for exports leads to increased costs at home but lower costs abroad, because less intermediate goods need be produced abroad per unit of final output. The resulting revenue and cost functions are:

$$R_H = R_H(Q_H - S) \tag{A:21}$$

$$R_A = R_A(Q_A + S) \tag{A:22}$$

$$C_H = C_H(Q_H, Y) \tag{A:23}$$

$$C_A = C_A(Q_A, Y) \tag{A:24}$$

The firm's profit function is now

$$\pi = R_H(Q_H - S) + R_A(Q_A + S) - C_H(Q_H, Y) - C_A(Q_A, Y) \tag{A:25}$$

and profit maximization means

$$\frac{\delta\pi}{\partial Q_H} = R_H'(Q_H - S) - \frac{\partial C_H}{\partial Q_H}(Q_H, Y) = 0 \tag{A:26}$$

$$\frac{\partial\pi}{\partial S} = -R_H'(Q_H - S) + R_A'(Q_A + S) = 0 \tag{A:27}$$

$$\frac{\partial\pi}{\partial Y} = -\frac{\partial C_H}{\partial Y}(Q_H, Y) - \frac{\partial C_A}{\partial Y}(Q_A, Y) = 0 \tag{A:28}$$

$$\frac{\delta\pi}{\delta Q_A} = R'_A\ (Q_A+S) - \frac{\delta C_A}{\delta Q_A}\ (Q_A,\ Y) = 0 \qquad \text{(A:29)}$$

Equation (A:26) states that home production should be such that marginal revenue from home sales equals the marginal cost of home production. Equation (A:27) says that exports of final goods should be such that marginal revenue from home sales equals marginal revenue from foreign sales of final output. Equation (A:28) says that exports of intermediate goods should be such that the marginal cost of home production of intermediate goods equals the marginal gain from intermediate goods in foreign production. Equation (A:29), finally, states that foreign production should be carried to the point where marginal revenue from foreign sales equals the marginal cost of foreign production.

What is the effect of foreign production controls in such a model? We assume that $Q_A = \bar{Q}_A$, violating $\frac{\partial\pi}{\partial Q_A} = 0$, and we want to find $\frac{dQ_H}{d\bar{Q}_A}$, $\frac{dS}{d\bar{Q}_A}$ and $\frac{dY}{d\bar{Q}_A}$. To do so we totally differentiate the first three equations:

$$\begin{bmatrix} R''_H - \dfrac{\partial^2 C_H}{\partial Q_H^2} & -R''_H & -\dfrac{\partial^2 C_H}{\partial Q_H \partial Y} \\ -R''_H & R''_H + R''_A & 0 \\ -\dfrac{\partial^2 C_H}{\partial Q_H \partial Y} & 0 & \dfrac{\partial^2 C_H}{\partial Y^2} - \dfrac{\partial^2 C_A}{\partial Y^2} \end{bmatrix} \begin{bmatrix} dQ_H \\ dS \\ dY \end{bmatrix} = \begin{bmatrix} 0 \\ -R''_A\ d\bar{Q}_A \\ \dfrac{\partial^2 C_A}{\partial Y \partial Q_A}\ d\bar{Q}_A \end{bmatrix} \qquad \text{(A:30)}$$

Let det denote the determinants of the above matrix. We know that det < 0 (second-order condition).

We rewrite the system as

$$\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{12} & a_{22} & 0 \\ a_{13} & 0 & a_{33} \end{bmatrix} \begin{bmatrix} dQ_H \\ dS \\ dY \end{bmatrix} = \begin{bmatrix} 0 \\ b_2 d\bar{Q}_A \\ b_3 d\bar{Q}_A \end{bmatrix} \tag{A:31}$$

and apply Cramer's rule:

$$\frac{dQ_H}{d\bar{Q}_A} = \frac{-a_{13}a_{22}b_3 - a_{33}a_{12}b_2}{\det} \tag{A:32}$$

$$\frac{dS}{d\bar{Q}_A} = \frac{a_{11}b_2a_{33} + a_{12}b_3a_{13} - a_{13}^2b_2}{\det} \tag{A:33}$$

$$\frac{dY}{d\bar{Q}_A} = \frac{a_{11}a_{22}b_3 + a_{12}b_2a_{13} - a_{12}^2b_3}{\det} \tag{A:34}$$

Can we determine the sign of these total derivatives? We know that

(1) a_{11}, a_{22}, $a_{33} < 0$ (2nd-order condition)

(2) $a_{12} > 0$ (decreasing marginal revenue)

(3) $a_{13} \lesseqgtr 0$ (if marginal cost of Q_H increases with increased production of Y, $a_{13} < 0$, if it decreases $a_{13} > 0$; if marginal cost of Q_H is unaffected by Y, $a_{13} = 0$)

(4) $b_2 > 0$ (analoguous to a_{12})

(5) $b_3 \gtreqqless 0$ (analoguous to a_{13}).

From this follows that

$$\frac{dQ_H}{d\bar{Q}_A} < 0 \tag{A:35}$$

$$\frac{dS}{d\bar{Q}_A} < 0 \tag{A:36}$$

since $(a_{11}a_{33}-a_{13}^2) > 0$ (2nd-order condition)

$$\frac{dY}{d\bar{Q}} \lesseqgtr 0 \tag{A:37}$$

since $(a_{11}a_{22}-a_{12}^2)b_3 \geqq 0$, but $a_{12}b_2a_{13} \leqq 0$

Thus, the easing of foreign production controls will, in this model, lead to a decrease in domestic production and a decrease in the exports of substitute final products. The effect on complementary goods exports is indeterminate, depending on whether the marginal cost of home production increases with, falls with, or is unaffected by increased production of Y. It is clear that the marginal cost of home production is not independent of the marginal cost of Y, since intermediate products enter into the production of final output. But it can fall with, or be unaffected by increased production of Y, if marginal cost of Y-production is constant. Then, $a_{13} \geqq 0$ and $\frac{dy}{d\bar{Q}_A} > 0$. The positive effect on complementary exports will not be offset by increased costs of home production.

Appendix B

The IUI Survey Data on Swedish Manufacturing Investment Abroad

The IUI surveys of the foreign operations of the Swedish mining and manufacturing industry in 1965, 1970 and 1974 are unique in that there exists no comparable information - official or otherwise - in Sweden. A similar survey, covering, in addition, foreign operations by other industries, for 1960-65 was undertaken by Lund [1967] on behalf of the Swedish Employers' Confederation and the Federation of Swedish Industries. A benchmark survey of employment in foreign affiliates of Swedish firms in all industries in 1974 was undertaken by the Central Bureau of Statistics (SCB) and coordinated with our own survey for that year.

The 1960 data on foreign investment has been made available to us and is presented in a way which permits comparison with the IUI data for later years in Swedenborg [1973 and 1976]. Some data tables describing the size and growth of the foreign operations of Swedish mining and manufacturing firms are also presented in Appendix C.

Since the IUI data have not been presented to non-Swedish readers before, a brief description of the scope and methodology of these surveys is given below. The present author was mainly responsible for the design and the execution of the surveys on both occasions. In the 1965-70 survey this responsibility was shared with Eva Thiel. In the 1974 survey it was shared with Bo Lindörn and Rolf Rundfelt, who were, however, primarily responsible for the collection and analysis of data on the financial flows between the Swedish and foreign corporate groups.

Scope of the surveys

The purpose of the surveys has been to obtain information regarding, especially, the foreign manufacturing activities of Swedish industry and the Swedish parents, which would permit analysis of the determinants of multinational operations and their effects on the Swedish economy.

Data has been collected in two survey operations, in 1971 and 1975 respectively. On both occasions, the surveys were designed to cover all Swedish mining and manufacturing firms, which had affiliates abroad or minority interests in foreign manufacturing firms in any of the survey years 1965, 1970 or 1974. The 1965-70 survey covered all foreign manufacturing and sales affiliates of the Swedish parent and foreign manufacturing firms, in which the investing firm had a minority interest. The 1974 survey covered, in addition, affiliates and minority interests in other sectors than manufacturing and trade.

Both surveys requested detailed information on foreign manufaturing affiliates but only limited information on other affiliates and on minority interests. Analoguously, they requested more detailed information on Swedish parents which had manufacturing affiliates abroad than on those which had only sales affiliates or minority interests abroad.

Despite the limitation to the foreign operations of the manufacturing sector, benchmark surveys (Lund, [ibid], and SCB, [ibid]) show that some 90 % of all foreign affiliates and minority interests of Swedish firms are covered by the IUI surveys.

Swedish manufacturing firms in the surveys are defined as firms in Sweden, which are not affiliates of foreign firms and which are mainly in mining or manufacturing. Manufacturing firms with less than 50 employees in Sweden and foreign investment undertaken by private individuals, e.g., owners of family businesses, are excluded.

In principle, the whole corporation is regarded as the unit of analysis and the consolidated group of Swedish firms - parent company and subsidiaries in Sweden - as the investing firm or "the Swedish parent". The Swedish corporate parent was asked to supply information regarding its overall operations, both in Sweden and abroad.

The reason for treating the whole corporation as one entity is that the corporate parent is the ultimate decision making unit and decisions are reached with regard to their implications for the entire operations. Hence, an analysis of the motives for, and effects of, foreign investment must be based on information regarding the whole firm.

However, we have made exceptions from the general rule of including only manufacturing firms and of treating the whole corporation as the unit of analysis. Large manufacturing firms, which are subsidiaries of Swedish firms in other sectors (shipping and retail trade), have been treated as parent companies and independent of the non-manufacturing part of the corporate group. We preferred this to excluding them. In addition, manufacturing firms which are subsidiaries of holding and investment companies but which, in practice, are quite independent of other companies within the group have also been treated as separate corporations.

Foreign affiliates or subsidiaries (and sub-subsidiaries) are defined in accordance with Swedish corporate law as firms in which the corporate parent directly or indirectly holds more than 50 % of the share capital. These firms are included in the consolidated accounts of the corporate parent.

Minority interests are defined as firms in which the Swedish firm directly or indirectly holds at least 10 % and no more than 50 % of the share capital. These firms are not included in the corporate accounts, and the investing firm can generally supply only limited information regarding them.

Foreign manufacturing affiliates are affiliates which have any manufacturing activity (including assembly) abroad, even if this is not its main activity by value.

Foreign sales affiliates are affiliates which sell, install and service the products of other firms and have no manufacturing.

Other foreign affiliates are affiliates in sectors other than manufacturing and trade.

The reason for the wide definition of manufacturing affiliates is that we wanted to cover all foreign manufacturing by Swedish firms. It means, however, that a number of affiliates are classified as manufacturing even though they are, in fact, mainly sales affiliates. In 1970, firms for which the sales value of output was more than 50 % of total sales made up 78 % of the total number of "manufacturing affiliates" and accounted for around 85 % of employment and total assets in all "manufacturing affiliates".

Collecting the data and response rate

Information on Swedish foreign investors was collected by means of questionnaires sent to the Swedish corporate parent. The population of such firms meeting the criteria of the survey was not known but had, on both occasions, to be determined by us

All Swedish firms which want to invest abroad must apply for permission to do so from the Central Bank. We were allowed the use of the Central Bank's confidential register of all firms which had been granted permission to invest abroad since 1955. This register contained over 1 500 names of firms, but on the basis of external information regarding these firms[1] a large number could be eliminated because they did not meet the criteria of the surveys.

Most firms were eliminated because they were not manufacturing firms with more than 50 employees or because they could not be identified and located. Some 100 firms were eliminated because they were foreign owned and approximately the same number because they were subsidiaries of a corporation already included. Of the little more than 350 firms in Sweden, to which the questionnaires were sent, approximately an additional 100 firms were dropped because they, too, were found not to meet the criteria for our sample, e.g., because their foreign activities had been discontinued or because their permission to invest abroad had not yet been used in the survey year.

Some 260-270 firms responded on both survey occasions, implying a response rate of 97-99 % of the total. Most of the firms which did not supply any information were small, so the response rate is not lower if it is weighted by the size of firms. The data should, therefore, represent a nearly complete coverage of the foreign operations of Swedish mining and manufacturing industry However, a further reservation is in order: the coverage of, especially, smaller investors may be incomplete also because the Central Bank register may not include all firms with foreign interests and because we have erroneously stricken firms from that list.

Failure to respond completely was relatively more common than failure to give any information at all. The information obtained from most firms is

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[1] For example the following sources: Svenska Aktiebolag (listing all corporations with share capital in excess of 1 million kr), Svensk Industrikalender (The Federation of Swedish Industries' calendar of Swedish firms), SAF:s Matrikel (The Employers' Federation's register of Swedish firms) and "Vem äger vad i svenskt näringsliv?" ("Who owns what in Swedish industry?")

sufficient to make for nearly complete coverage in the tables in Appendix C. But missing values on one or a few variables have led to many observations being omitted from the country regressions presented in the main text.

Although 90 % of all firms had responded within 3 months of having received the questionnaires, collecting, checking, supplementing, and correcting the questionnaire data stretched over a 1 year period on the first survey occasion (up to September 1972) and over an 8 month period on the second occasion (up to December 1975). (The result of a "learning effect" both on the part of investigators and investigated!) Follow-up contacts was by telephone with the responsible individuals in the finance and accounting departments of the participating firms.

Considerable effort has been spent by the participating firms in supplying the information requested. The work required was proportionate to the number of foreign manufacturing affiliates of the firm as well as to the number of affiliated Swedish firms for which the parent had to consolidate data. (The consolidation over the Swedish group is not one which the firm does for its own records.) In the 1965-70 survey,the 15 largest foreign investors reported that they devoted 4-8 man weeks in answering the questionnaires. In the 1974 survey (counting only time spent on Forms A and B on which the present study is based, cf below) this time was considerably shortened. The difference is due to less information being asked on the foreign manufacturing affiliates and to the fact that much of the information requested on the foreign activities has, in the interim, become part of the reporting routine in the larger firms. Undoubtedly, the time devoted by firms has made for a high quality of the data, on average. Deficiencies will, however, always remain in this kind of data.

The questionnaire forms

In large part there is an exact correspondence between the information requested in the 1965-70 and in the 1974 survey respectively. In both surveys there was a Form A for information on the Swedish parent group and on the consolidated firm and a Form B for each manufacturing affiliate abroad. The main difference is that the earlier survey requested relatively detailed information from the balance sheet and the income statement of foreign manufacturing affiliates. Much of this was eliminated in the 1974 survey, which instead requested much more detailed information on the financial flows between the Swedish and the foreign groups. This was reported on a separate form, Form C.

The present study is based on information contained in Forms A and B, supplemented with the following items from the financial data on Form C: total assets, book value and fire insurance value of property, plant and equipment, and gross operating profits for the Swedish parent group and for the consolidated Swedish and foreign groups.

Forms A and B, accompanying "Instructions and definitions" and the letter sent to the firm from IUI in the 1974 survey are reproduced below *pro forma*, since no translation is supplied. The corresponding material for the 1965-70 survey is contained in Swedenborg [1973].

Industriens Utredningsinstitut
(THE INDUSTRIAL INSTITUTE FOR ECONOMIC AND SOCIAL RESEARCH)
Storgatan 19 - Box 5037 - 102 41 Stockholm 5 - Telefon 08-63 50 20 - Bankgiro 446-9995
Postgiro 19 15 92-5

Stockholm den 16 april 1975

Svenska industriföretags direkta investeringar i utlandet

Industriens Utredningsinstitut genomförde 1971 en omfattande enkätundersökning av svenska industriföretags direkta investeringar i utlandet under åren 1965 och 1970. Resultaten från denna undersökning redovisades i boken "Den svenska industrins investeringar i utlandet" (Swedenborg, B., 1973, IUI). Där visades bl a att industrins utlandsverksamhet vuxit mycket starkt under 1960-talet och uppnått en sådan storlek att den är av väsentlig betydelse för den svenska ekonomin. Under 1970-talet har denna utveckling fortsatt och krav har ånyo ställts från olika håll på aktuell information om den utländska verksamheten. Institutets styrelse har därför uppdragit åt institutet att göra en uppföljning av den tidigare enkätundersökningen i förhoppning om att företagen kommer att medverka i samma stora utsträckning som i den tidigare undersökningen. Information om företagens utlandsverksamhet är värdefull inte bara för den ekonomisk-politiska debatten utan har även visat sig vara av direkt intresse för näringslivet.

Syftet med 1975 års enkät, liksom med den tidigare, är att kartlägga omfattningen av svenska industriföretags utlandsverksamhet samt därmed sammanhängande betalningsflöden mellan Sverige och utlandet. Det sistnämnda innebär en kartläggning av varuströmmarnas omfattning och riktning, flödet av tjänster (royalties, licenser och patent etc.), räntor och utdelningar samt kapital mellan Sverige och utlandet.

Enkätformulärens utformning har diskuterats med en rådgivande kommitté bestående av direktör Bengt Andersson, Atlas Copco AB, i egenskap av näringslivets förtroendeman i frågor rörande statistiklämnande samt av representanter för Svenska Arbetsgivareföreningen (SAF) och Sveriges Industriförbund (SI).

Statistiska centralbyrån har planerat att genomföra en egen insamling av statistik om de utlandsinvesterande företagens utländska verksamhet. I diskussioner med SCB har förutsättningen för en närmare samverkan undersökts, eftersom den av SCB önskade informationen i huvudsak inryms i IUI:s enkät. Med hänsyn till att någon officiell uppgiftsskyldighet i detta fall inte föreligger och till att utlämnandet av ifrågavarande information av många företag har ansetts mycket känsligt har det lämpligaste förfaringssättet bedömts vara att SCB själv svarar för sin informationsinsamling.

Undersökningen omfattar samtliga svenska industriföretag som hade tillgångar i utlandet 1974 till följd av en direkt investering. Företagen ombeds ta del av "Upplysningar och anvisningar angående enkäten" samt fylla i blankett A och i tillämpliga fall blanketterna B och C. Vi skulle vara tacksamma för att få de ifyllda blanketterna tillbaka före den 30 maj 1975.

De lämnade uppgifterna kommer givetvis att behandlas konfidentiellt och kommer inte att publiceras på sådant sätt att enskilda företag kan identifieras. Ytterligare frågor beträffande denna utredning och ifyllandet av blanketterna besvaras gärna av de på blanketterna namngivna personerna inom institutet.

Med utmärkt högaktning och med tack för vänlig medverkan

Lars Wohlin

Lars Wohlin

INDUSTRIENS UTREDNINGSINSTITUT
BOX 5037
102 41 STOCKHOLM 5
TEL. 08/63 50 20

REF. ROLF RUNDFELT, BO LINDÖRN OCH BIRGITTA SWEDENBORG

BLANKETTERNA INSÄNDS FÖRE DEN 30 MAJ 1975

Upplysningar och anvisningar angående enkäten om svenska industriföretags direkta investeringar i utlandet

I. UNDERSÖKNINGENS OMFATTNING

Institutets undersökning omfattar samtliga svenska industriföretag som hade tillgångar i utländska dotter- och dotterdotterföretag och/eller minoritetsintressen i utländska företag 1974. Intresset koncentreras till producerande dotterföretag i utlandet. Rent försäljande och övriga rörelsedrivande dotterföretag, liksom minoritetsägda företag omfattas i mer begränsad utsträckning.

Enkäten sänds till svenska industriföretag som erhållit tillstånd från riksbanken att företa direkta investeringar i utlandet. Företag som erhåller enkäten trots att de ej omfattas av undersökningens urvalskriterier ombeds i sitt svar ange om tillståndet avsåg utländska intressen av annat slag än sådana som berörs av undersökningen, om ett tidigare utlandsintresse avvecklats före 1974 eller om investeringstillståndet ännu ej utnyttjats detta år.

II. DEFINITIONER

Direkta investeringar utgörs enligt Internationella Valutafondens definition av investeringar i dotter- och dotterdotterföretag i utlandet eller förvärv av minoritetspost i ett utländskt företag med vilket investeraren har en väsentlig intressegemenskap. Begreppet innefattar således ej s k portföljinvesteringar, dvs investeringar i företag där investeraren ej har intresse av eller möjlighet att utöva kontroll över vederbörande företags löpande förvaltning.

Som *svenskt industriföretag* betraktas företag som är registrerat i Sverige och som inte är dotterföretag till ett utländskt företag samt är verksamt huvudsakligen inom industrin.

Till *producerande företag* räknas här alla företag som utför någon form av varuproduktion, såsom utvinning, tillverkning eller sammansättning av varor. Även företag som huvudsakligen bedriver annan verksamhet, t ex försäljning, men därutöver utför någon produktion räknas i denna undersökning som producerande företag.

Till *försäljningsföretag* räknas här företag som endast ägnar sig åt försäljning, eventuellt kombinerat med installations- och serviceverksamhet. Försäljningen skall i inte obetydlig utsträckning utgöras av koncernens produkter. I de fall då sammansättning eller montering av varor är en så enkel process att den även kan utföras av kunden och av företaget inte betraktas som industriell tillverkning kan detta produktionsled innefattas i försäljningsföretagets verksamhet.

Övriga rörelsedrivande företag är företag som är verksamma inom andra näringsgrenar än industri och handel.

Dotterföretag och *dotterdotterföretag* eller *koncernföretag* utgörs av företag i vilka aktiekapitalet ägs till mer än 50 % av ett eller flera koncernföretag. Sådana företag omfattas enligt § 221 i aktiebolagslagen av koncernredovisningen.

Svenska koncernföretag eller den *svenska koncerndelen* utgörs av moderföretaget och övriga i Sverige belägna koncernföretag.

Utländska koncernföretag eller den *utländska koncerndelen* utgörs av koncernföretag belägna i utlandet.

Utländska minoritetsintressen definieras som företag i utlandet i vilka minst 10 % och högst 50 % av aktiekapitalet ägs av ett eller flera koncernföretag.

III. UNDERSÖKNINGENS SYFTE

Denna enkät utgör en uppföljning av den enkätundersökning angående svenska industriföretags direkta investeringar i utlandet som institutet företog 1971. Syftet med föreliggande enkät, liksom med den tidigare, är att kartlägga omfattningen av svenska industriföretags utlandsverksamhet samt därmed sammanhängande betalningsflöden mellan Sverige och utlandet. Det sistnämnda innebär en kartläggning av varuströmmarnas omfattning och riktning, flödet av tjänster (royalties, licenser och patent, etc), räntor och utdelningar samt kapital mellan Sverige och utlandet.

I huvudsak är 1975 års enkät upplagd på samma sätt som 1971 års, vilket möjliggör detaljerade jämförelser mellan enkätåren 1965, 1970 och 1974. Den viktigaste skillnaden rör uppgifter om företagens utländska tillgångar och skulder och förändringen i dessa. I stället för att som i 1971 års undersökning begära uppgifter från varje enskilt producerande dotterföretags balans- och resultaträkning (på blankett B i den föregående undersökningen), efterfrågas dessa uppgifter för *hela* koncernen samt med uppdelning på den svenska och utländska koncerndelen (på blankett C i 1975 års undersökning).

IV. ENKÄTENS UTFORMNING

Det företag som ombeds besvara enkäten är moderföretaget i koncernen. Detta innebär att koncernens moderföretag ombeds rapportera även direkta investeringar i utlandet som företagits av dotter- eller dotterdotterföretag i Sverige. Om det väsentligen skulle underlätta besvarandet av enkäten kan emellertid annat svenskt koncernföretag än moderföretaget besvara enkäten beträffande sina utländska investeringar. I dessa fall bör separata frågeformulär ifyllas i tillämpliga delar såväl av koncernens moderföretag som av ifrågavarande dotterföretag, eftersom det är av vikt att vi erhåller uppgifter rörande hela koncernen.

Enkäten består av tre formulär. *Blankett A* insänds i ett exemplar och avser uppgifter om företaget/koncernen i Sverige samt vissa uppgifter om dess intressen i utlandet. Företag som äger producerande dotterföretag i utlandet ombeds dessutom besvara *blanketterna B och C*. Blankett B ifylls därvid i ett exemplar för vart och ett av de producerande utländska dotterföretagen. Blankett C insänds i ett exemplar och avser uppgifter om koncernens tillgångar och skulder i Sverige och utlandet 1974 samt förändringen i dessa 1971—1974.

Blankett B kan erhållas i engelsk översättning för de fall vissa uppgifter behöver lämnas direkt av de utländska koncernföretagen. Dessutom bifogas kopior av samtliga blanketter att behållas av företagen själva. Ytterligare exemplar av blanketterna kan erhållas från institutet.

V. VALUTAOMRÄKNING

Alla belopp bör uttryckas i svenska kronor efter omräkning till den valutakurs som rådde vid utgången av 1974 (och 1971—74 i Avd. II och III på blankett C). Om annan växelkurs används i koncernbokslutet kan denna kurs användas. I sådana fall bör detta särskilt anges under punkten "Kompletterande uppgifter" i respektive avdelning.

VI. RÄKENSKAPSÅR

Uppgifterna skall avse kalenderåret 1974 samt åren 1971—1973 när det gäller blankett C, avdelningarna II och III. I regel torde räkenskapsåret sammanfalla med kalenderåret, varför uppgifter direkt kan hämtas ur företagens redovisningshandlingar. Företag med brutet räkenskapsår kan dock i stället lämna uppgifter för det räkenskapsår som närmast sammanfaller med kalenderåret. Vid räkenskapsår 1 juli—30 juni anges uppgifter för räkenskapsåret 1973/74 osv. Om räkenskapsåret ej omfattar 12 månader skall detta anges.

VII. EXAKTHET I UPPGIFTSLÄMNANDET

En hel del av de begärda uppgifterna finns förhoppningsvis relativt lätt tillgängliga för de flesta företag. När så inte är fallet efterfrågas emellertid inte redovisningsmässig exakthet i svaren utan rimliga uppskattningar. Det är viktigt att sådana uppskattningar i möjligaste mån görs jämförbara mellan olika dotterföretag och länder. Om speciellt stor osäkerhet vidlåder en viss uppgift var god ange detta under punkten "Kompletterande uppgifter" i respektive avdelning.

VIII. SÄRSKILDA ANVISNINGAR TILL FRÅGORNA

Nedanstående nummer återfinns i anslutning till den fråga på blanketterna som förklaringen avser.

1. I blanketterna skall anges företagets/koncernens *huvudsakliga branschtillhörighet* enligt nedanstående kodförteckning. Om företagets/koncernens verksamhet fördelar sig på mer än en bransch anges således den bransch inom vilken den övervägande delen av verksamheten faller.

Bransch	*Bransch-kod*	*Bransch*	*Bransch-kod*
Gruvindustri	01	Jord- och stenvaruindustri	10
Livsmedelsindustri	02	Järn-, stål- och metallverk	11
Dryckesvaru- och tobaksindustri	03	Metallvaruindustri	12
Textil- och beklädnadsindustri	04	Maskinindustri	13
Läder- och lädervaruindustri	05	Elektroindustri	14
Trävaruindustri	06	Transportmedelsindustri	15
Massa- och pappersindustri	07	Varvsindustri	16
Grafisk och pappersvaruindustri	08	Industri för instrument, foto- och optikvaror, ur	17
Kemisk och plast- och gummivaruindustri	09	Annan tillverkningsindustri	18

2. För de utländska dotterföretag och minoritetsägda företag som inte är i huvudsak producerande skall *verksamhetstypen* anges enligt nedanstående kodförteckning:

1. Handel	5. Forskningsverksamhet
2. Jord- och skogsbruk	6. Koncernledning
3. Byggnadsindustri	7. Transport
4. Kraftverk	8. Övriga tjänster

3. Moderföretagets (i koncernen) *direkta* och *indirekta* andel av det utländska företagets aktiekapital beräknas på följande sätt: Antag att 80 % av aktie- eller andelskapitalet i ett utländskt koncernföretag ägs av ett annat utländskt företag som i sin tur till 60 % ägs av det svenska moderföretaget. Moderföretagets direkta och indirekta ägande i dotterdotterföretaget blir då 60 % × 80 % = 48 %. De svenska koncernföretagens direkta ägande i dotterdotterföretaget blir noll. Att dotterdotterföretaget klassificeras som koncernföretag bestäms av att det till mer än 50 % — här 60 % — ägs av ett annat koncernföretag.

4. Antalet *anställda i minoritetsägda företag* i utlandet kan vara en svårtillgänglig uppgift. Även en grov uppskattning på denna punkt vore emellertid värdefull.

5. *Exporten* bör om möjligt värderas fob, dvs till det pris som erhålls när varorna lämnar landet. Om någon annan värderingsprincip använts för beräkning av de begärda exportsiffrorna, var god ange hur denna förhåller sig till fob-priserna.

6. *Antal anställda* avser antalet anställda i medeltal under året. Finns denna uppgift ej tillgänglig, uppges i stället det aritmetiska medelvärdet av antal anställda i början respektive slutet av året.

7. Definitionen av *arbetare och tjänstemän* skiljer sig ofta mellan olika länder. Om någon enhetlig definition inte tillämpas inom hela koncernen, kan därför de lämnade uppgifterna baseras på den indelning som respektive utländskt dotterföretag gör eller kan göra.

8. Om uppgift om lönebikostnader i de utländska dotterbolagen saknas ombeds företaget göra ett procentuellt påslag på lönesumman.

9. Statistiska centralbyråns definition av *forskning och utvecklingsarbete* inom industrin omfattar grundforskning, tillämpad forskning och utvecklingsarbete inom naturvetenskap, teknologi, medicin, lantbruksvetenskap m m, men ej inom samhällsvetenskaplig och humanistisk forskning (innefattande marknadsforskning, företagsekonomisk forskning etc). Vidare sägs att i allt arbete som hänförs till FoU skall finnas ett nyhetselement. Ett normalt konstruktionsarbete som helt följer utstakade banor och etablerade rutiner skall ej räknas till FoU. Kostnader för FoU omfattar driftskostnader och periodicerade kapitalkostnader för av företaget med egen personal bedrivet FoU-arbete samt utbetalda medel för FoU som på företagens uppdrag utförts av annan. Licensbetalningar bör däremot ej inkluderas som utgift för FoU.

10. De flesta företag gör en uppdelning av sin tillverkning och försäljning på divisioner, sektorer, huvudsakliga *produktgrupper* eller produkter. Grunden för denna indelning kan vara produkternas användningsområden, dvs försäljningsinriktad, eller, vilket är vanligare, produktionsmetoder, dvs produktionstekniskt bestämd. Här vore det önskvärt att denna indelning kunde ske på grundval av produktionsmetoder eller av i produktionen använda material, dvs motsvara de klassificeringsprinciper som används i svensk industri- och handelsstatistik (SNI resp. SITC). Vidare är det önskvärt att så långt möjligt samma indelningsgrunder används vid en produktuppdelning av de svenska koncernföretagens produktion och export som vid en produktuppdelning av de utländska dotterföretagens produktion, även om den sistnämnda görs mer finfördelad. Rimliga uppskattningar kan mycket väl godtas, om uppgifterna är svåra att beräkna på grundval av tillgänglig information inom företaget.

11. Ett exempel kan förtydliga anvisningen för företag med utländska producerande dotterföretag i färre än 6 länder. Antag att ett företag har 3 producerande dotterföretag i utlandet 1974. Ett av dessa ligger i Västtyskland, ett i Storbritannien och ett i Colombia. De två förstnämnda länderna är särskilda i länderförteckningen i fråga 19 och företaget ombeds ange koncernens omsättning i och export till dessa länder. Colombia är däremot inte särskiljt och någon uppgift behöver därför inte lämnas, vare sig för detta land eller för Latinamerika, i vilket det ingår.

12. Skillnaden mellan total omsättning och värdet av varor tillverkade eller sammansatta vid dotterföretaget utgörs av varor som endast återförsäljs utan vidare förädling vid företaget. Återförsäljningen kan utgöras av varor som tillverkats vid andra koncernföretag eller av varor som inköpts från utomstående företag.

13. *Dotterbolagens import* värderas fob, dvs till de priser som erhålls när varorna lämnar Sverige. I de fall då de svenska koncernföretagens totala export till landet ifråga går via detta dotterföretag blir uppgifterna under 11) lika med de uppgifter som lämnats för ifrågavarande land under fråga 19) på blankett A.

14. *Kortfristiga skulder* avser skulder vars ursprungliga löptid är högst 1 år. Övriga skulder är *långfristiga*. Samma avgränsning gäller fordringar. Årets amortering bör således redovisas som långfristig skuld. I det fall den här angivna avgränsningen är svår att följa för företaget, kan företaget här i stället använda de klassificeringsprinciper som brukas i företaget. Ange i så fall vilka principer som följs.

I enkäten görs undantag från denna regel för leverantörsskulder (kundfordringar) och banklån. De förra redovisas helt som kortfristiga och de senare som långfristiga. I kundfordringar respektive leverantörsskulder inkluderas även växlar och förskott.

15. *Lån från stat och kommun* (landsting) omfattar långfristiga lån från stat och kommun, såsom t ex lokaliseringslån. Den svenska koncerndelen redovisar lån från stat och kommun (landsting) i Sverige och den utländska koncerndelen lån från motsvarande offentliga myndigheter i utlandet.

16. Exempel på *övriga poster* är förändring i andra skulder än sådana som förmedlas via den organiserade kreditmarknaden, nyemissioner respektive nyteckning av aktier, insättning respektive uttag av medel på spärrade banktillgodohavanden m m.

BLANKETT A
KONFIDENTIELLT

SVENSKA INDUSTRIFÖRETAGS DIREKTA INVESTERINGAR I UTLANDET

INDUSTRIENS UTREDNINGSINSTITUT
BOX 5037
102 41 STOCKHOLM 5
TELEFON 08/63 50 20

REF. ROLF RUNDFELT, BO LINDÖRN OCH BIRGITTA SWEDENBORG.

BLANKETTEN INSÄNDS FÖRE DEN 30 MAJ 1975 TILL INDUSTRIENS UTREDNINGSINSTITUT.

Blankett A: Uppgifter om företaget/koncernen i Sverige och dess intressen i utlandet.

Före ifyllandet av frågeformulären var god se **upplysningar och anvisningar angående enkäten.** En utförligare förklaring av enskilda frågor ges i anvisningen vars nummer anges i anslutning till frågan.

AVD. I.

	IUI:s kod
1. Företagets/moderföretagets namn och adress: ______ ______	
2. Kontaktperson: ______ Tel. ______ / ______ ankn. ______	
3. Företagets/de svenska koncernföretagens huvudsakliga branschtillhörighet. Ange i svarskolumnen branschens siffra enligt branschkoden i anvisningrana, VIII:1	

4. Var god ange nedan vilka i Sverige belägna rörelsedrivande dotterföretag och viktigare dotterdotterföretag som omfattas av koncernens redovisning för år 1974.

Med viktigare dotterdotterföretag i Sverige avses här framför allt större industriföretag samt företag med aktier i utländska företag.

☐ Medverkade

För de företag som 1971 medverkade i institutets undersökning av utlandsinvesteringarna räcker det här att ange vilka större företag som tillkommit i eller utgått ur koncernen efter 1970. Om företaget medverkade eller ej framgår av kryssmarkeringen i vidstående ruta.

☐ Medverkade ej

Företagets namn:

5. Antal **producerande dotterföretag** i utlandet 1974.
Se anvisningarna, II.
För varje producerande dotterföretag insänds en blankett B.

Antal

6. Uppgifter angående **försäljande dotterföretag** i utlandet 1974.
Se anvisningarna, II.
Var god ange de svenska koncernföretagens direkta ägande i försäljande dotterföretag enligt följande kod:
0—10 % = 1, 11—20 % = 2, 21—30 % = 3, 31—40 % = 4, 41—50 % = 5, 51—100 % = 6.
Om det finns mer än ett försäljande dotterföretag i ett land och de svenska koncernföretagens ägande behöver anges med olika kod, ombeds företaget lämna uppgifter om dessa företag på olika rader. I annat fall kan uppgifter om dotterföretag i samma land slås ihop.

Land	IUI:s kod	Antal företag	Antal anställda	Andel av aktiekapitalet som ägs direkt av de svenska koncernföretagen enligt kod ovan

7. Uppgifter angående **övriga rörelsedrivande dotterföretag** i utlandet 1974.

Se anvisningarna, II samt VIII:2 och 3.

Land	IUI:s kod	Verksamhetstyp (enligt) koden i VIII:2)	Antal anställda	Bokfört värde på eget kapital 1 000 kr	Andel av aktiekapitalet som ägs: direkt och indirekt av moderföretaget, %	Andel av aktiekapitalet som ägs: direkt av de svenska koncernföretagen %

8. Uppgifter angående **minoritetsägda företag** i utlandet 1974.

Med minoritetsägda företag menas här att minst 10 och högst 50 % av företagets aktiekapital ägs av ett eller flera koncernföretag.

För utländska produktionsföretag anges branschtillhörigheten nedan enligt branschkoden i anvisningarna VIII:1.

För utländska försäljningsföretag och övriga rörelsedrivande företag anges verksamhetstyp enligt koden i VIII:2.

Se även anvisningarna, II samt VIII:3 och 4.

Land	IUI:s kod	Branschtillhörighet; verksamhetstyp	Antal anställda	Bokfört värde på eget kapital 1 000 kr	Andel av aktiekapitalet som ägs: direkt och indirekt av moderföretaget, %	Andel av aktiekapitalet som ägs: direkt av de svenska koncernföretagen %

	1 000 kr
9. **Hela** koncernens externa fakturerade omsättning 1974. Koncernomsättning anges netto, dvs. efter avdrag för omsättningsskatter, rabatter och returer. All försäljning inom koncernen skall vara eliminerad.	
10. Företagets/de svenska koncernföretagens externa omsättning 1974. Exklusive försäljning inom koncernens svenska delar men inklusive försäljning till utländska dotterföretag.	
11. (a) Total fakturerad export från företaget/de svenska koncernföretagen 1974. Se anvisningarna, VIII:5.	
varav (b) försäljning till utländska dotterföretag. Inklusive försäljning till både försäljningsföretag och producerande företag.	

12. Kompletterande uppgifter:

AVD. II.

NEDANSTÅENDE FRÅGOR BESVARAS ENDAST AV FÖRETAG/KONCERNER MED PRODUCERANDE DOTTERFÖRETAG I UTLANDET.

	Antal anställda	
	Koncernen totalt	därav Sverige
13. (a) Antal anställda 1974. Se anvisningarna, VIII:6.		
varav (b) arbetare (kollektivanställda) Se anvisningarna, VIII:7.		

	1 000 kr	
	Koncernen totalt	därav Sverige
14. (a) Summa lönekostnader 1974. Härmed avses utbetalade löner och lönebikostnader. Se anvisningarna, VIII:8.		
varav (b) för arbetare (kollektivanställda)		

	1 000 kr
15. (a) De svenska koncernföretagens totala intäkter från licenser, patent, royalties, "know-how" och "management fees" 1974. Exklusive betalningar mellan svenska koncernföretag	
varav (b) intäkter från utländska koncernföretag	
(c) intäkter från utländska minoritetsägda företag	
(d) intäkter från övriga utländska företag	
16. (a) **Hela** koncernens kostnader för licenser, patent, royalties och "know-how" 1974. Exklusive betalningar mellan samtliga koncernföretag.	
varav (b) betalningar till andra länder än Sverige.	
17. (a) **Hela** koncernens kostnader för forsknings- och utvecklingsarbete (FoU). Exklusive betalningar mellan koncernföretag. Med kostnader för FoU avses såväl löpande utgifter som avskrivningar på kapitalutrustning för FoU enligt Statistiska Centralbyråns definition. Både FoU som utförts vid det egna företaget och det som utförts av annan på uppdrag av företaget skall inkluderas. Se anvisningarna, VIII:9.	
varav (b) för FoU bedrivet i Sverige	

18. De svenska koncernföretagens externa omsättning och export 1974, enligt uppgifterna 10 och 11a ovan, fördelad på produktgrupper 1974.

Exklusive försäljning inom koncernens svenska delar men inklusive försäljning till utländska dotterföretag.
Se anvisningarna, VIII:10.

Produkter/produktgrupper	IUI:s kod	Andel av omsättningen (%)	Andel av exporten (%)

19. **Hela** koncernens externa omsättning och export från Sverige 1974, enligt uppgifterna 9 och 11a ovan, fördelad på länder/länderområden.

Omsättningssiffrorna skall avse koncernens totala externa försäljning i respektive land inklusive import till och exklusive export från landet. All försäljning mellan koncernföretag i landet skall elimineras. Exporten från Sverige avser hela exporten, dvs såväl försäljning till koncernföretag som övrig export till landet ifråga.

Företag med producerande dotterföretag i 6 eller flera länder (utom Sverige) ombeds ange omsättning i och export till samtliga nedan uppräknade länder/länderområden.
Övriga företag ombeds lämna dessa uppgifter endast för de av de nedan uppräknade länderna i vilka de har producerande dotterföretag.

Se anvisningarna, VIII:11.

Länder/ländergrupper	IUI:s kod	1 000 kr Omsättning	1 000 kr Export från Sverige
Belgien			
Frankrike			
Italien			
Holland			
Västtyskland			
Danmark			
Norge			
Finland			
Schweiz			
Storbritannien			
Österrike			
Portugal			
Övriga Västeuropa			
varav Spanien			
Östeuropa			
USA			
Kanada			

19. (forts.) Länder/ländergrupper	IUI:s kod	1 000 kr	
		Omsättning	Export från Sverige
Syd- och Mellanamerika			
varav Argentina			
Brasilien			
Mexico			
Afrika			
varav Sydafrika			
Asien			
varav Indien			
Japan			
Australien			
Nya Zeeland			
Summa			

20. Kompletterande uppgifter:

KONFIDENTIELLT

SVENSKA INDUSTRIFÖRETAGS DIREKTA INVESTERINGAR I UTLANDET

INDUSTRIENS UTREDNINGSINSTITUT
BOX 5037
102 41 STOCKHOLM 5
TELEFON: 08/63 50 20

REF. ROLF RUNDFELT, BO LINDÖRN OCH BIRGITTA SWEDENBORG

BLANKETTEN INSÄNDS FÖRE DEN 30 MAJ 1975 TILL INDUSTRIENS UTREDNINGSINSTITUT

Blankett B: Uppgifter om det producerande dotterföretaget i utlandet

Före ifyllandet av frågeformulären var god se **upplysningar och anvisningar angående enkäten.** En utförligare förklaring av enskilda frågor ges i anvisningen vars nummer anges i anslutning till frågan.

	IUI:s kod
1. Företagets namn: ____________ Land: ____________ Moderföretaget i koncernen: ____________	

2. (a) Sedan när ingår företaget i koncernen som ett producerande dotterföretag? ________ år

   (b) Ingick företaget före ovannämnda år i koncernen som försäljningsföretag? ja ☐ nej ☐

   (c) Bedrev företaget före ovannämnda år produktion i annans ägo? ja ☐ nej ☐

	1974 1 000 kr
3. Totala tillgångar (total balansomslutning) Här avses bokfört värde av företagets tillgångar. Se även anvisningarna V.	
4. Värdet av företagets fasta anläggningstillgångar. Med fasta anläggningstillgångar avses fastigheter, maskiner och inventarier. (a) Bokfört värde	
(b) Brandförsäkringsvärde (eller motsvarande).	
5. Totalt eget kapital. Härmed avses totalt aktiekapital samt övrigt beskattat eget kapital som fonder, reserver och balanserade vinster.	
6. Andel av aktiekapitalet som ägs (a) direkt och indirekt av moderföretaget i koncernen	%
(b) direkt av de svenska koncernföretagen Se anvisningarna VIII:3.	%
7. Rörelseöverskott. Härmed avses omsättning minus tillverkningskostnader före avskrivningar.	
8. (a) Summa lönekostnader för anställda. Härmed avses utbetalade löner och lönebikostnader. Se anvisningarna VIII:8.	
varav (b) för arbetare	

	Antal anställda
9. (a) Antal anställda. Se anvisningarna, VIII:6 och 7.	
varav (b) arbetare	

	1974 1 000 kr
10. (a) Total fakturerad omsättning. Omsättning skall anges netto, dvs. efter avdrag för omsättningsskatter, rabatter och returer.	
varav (b) varor tillverkade eller sammansatta vid företaget. Se anvisningarna, VIII:12.	
11. (a) Total export av 10 (a). Export skall inkludera försäljning till koncernföretag. Se anvisningarna, VIII:5.	
varav (b) till Sverige	
12. (a) Import av varor från de svenska koncernföretagen. Se anvisningarna VIII:13.	
varav (b) varor för återförsäljning utan bearbetning vid företaget	
(c) varor för bearbetning vid företaget	
(d) investeringsvaror för användning vid företaget. Med investeringsvaror avses maskiner och inventarier.	

13. Sammansättning av företagets produktion enligt 10 (b) ovan.
Ange de huvudsakliga produkter/produktgrupper som produceras av företaget samt deras respektive andel av produktionen.
Se anvisningarna, VIII:10.

Produkter/produktgrupper	IUI:s kod	Andel av total produktion (%)

14. Kompletterande uppgifter

Appendix C

Some Basic Data on Foreign Affiliates of Swedish Manufacturing Firms

Table C:1 Foreign affiliates of Swedish manufacturing firms 1965-74

	Number of firms			Employment		
	1965	1970	1974	1965	1970	1974
Manufacturing affiliates	329	428	481	147 807	182 649	219 620
Sales affiliates	583	905	1 227	24 826	42 702	55 740
Other affiliates	*	*	64	*	*	15 520
Total	912	1 333	1 772	172 633	225 351	290 880
Minority interests[a]	56	91	119	27 515	59 800	77 060
Minority interests in non-manufacturing firms [a]	*	*	52	*	*	4 210
Total	56	91	171	27 515	59 800	81 270

* Not available.

[a] The columns for number of firms and for employment are not comparable. Information on employment is available for only 77 of the minority owned firms in 1974, for example.

Affiliates are firms in which the Swedish parent group directly or indirectly owns more than 50 % of the share capital.

Minority interests are firms in which the Swedish parent group directly or indirectly owns at least 10 % and no more than 50 % of the share capital.

Table C:2 Manufacturing affiliates abroad by industry: employment and total assets in 1960, 1965, 1970, and 1974

Industry	Number of firms 1974	Employment				Total assets, million kr			
		1960	1965	1970	1974	1960	1964	1970	1974
Food, drink, tobacco	4	205	568	1 967	1 562	12	28	137	198
Textiles, apparel, leather and leather products	22	240	1 084	3 367	5 844	5	21	79	158
Pulp and paper	11	0	1 568	3 875	5 797	0	291	1 036	1 698
Paper products, printing and publishing	33	111	1 508	3 820	6 438	11	88	416	1 093
Chemicals, rubber, plastic products	75	21 908	24 056	24 832	24 179	534	873	1 287	2 096
Primary and fabricated metals	112	7 133	11 666	19 106	25 769	418	935	2 185	3 579
Machinery (except electrical)	94	49 843	72 113	78 887	73 080	1 925	3 988	6 655	8 797
Electrical machinery	69	20 150	26 202	32 406	52 339	694	1 270	2 411	5 925
Transportation equipment	15	1 117	2 910	4 366	11 267	55	220	545	1 806
Other manufacturing	43	4 804	6 132	10 023	13 348	180	319	856	1 845
All industries	478	105 511	147 807	182 649	219 623	3 834	8 033	15 607	27 195

Table C:3 Manufacturing affiliates abroad by country: employment and total assets 1960, 1965, 1970, and 1974

Region and country	Number of firms[a] 1974	Employment 1960	1965	1970	1974	Total assets, mill.kr. 1960	1965	1970	1974
Industrial contries	399	87 608	120 711	145 606	174 256	3 340	6 964	13 322	22 932
EEC[b]	161	48 645	69 309	83 016		1 593	3 822	7 465	
Belgium	17	2 579	4 674	6 020	8 242	146	322	832	1 766
France	40	13 666	16 116	21 237	29 371	437	819	1 617	3 447
Italy	18	3 768	16 256	15 526	17 345	152	977	1 426	2 366
Netherlands	28	2 096	3 553	7 629	8 380	93	267	810	1 287
West Germany	58	26 536	28 710	32 604	33 891	765	1 438	2 780	4 770
EFTA[b]	157	22 597	30 204	39 772		748	1 405	3 211	
Denmark[b]	29	2 459	2 817	7 061	7 736	71	138	639	1 068
Norway	27	1 810	3 909	5 338	3 775	74	220	499	474
Finland	35	2 760	4 462	5 870	8 016	98	218	343	788
Switzerland	7	368	359	316	582	11	16	44	72
Great Britain[b]	35	12 047	14 679	13 927	15 583	397	650	990	1 395
Austria	12	1 974	2 555	3 301	2 873	75	132	266	275
Portugal	12	1 179	1 423	3 959	4 905	22	31	429	481
Other Europe[b]	21	722	1 094	2 475		15	50	207	
Spain	14	659	971	2 326	5 959	13	41	193	649
Ireland[b], Iceland[b], Greece, Turkey	7	63	123	149	1 198	2	9	14	58
North America	39	12 368	14 638	12 328	17 024	813	1 320	1 804	2 847
United States	26	9 651	12 483	9 807	13 345	662	917	1 097	1 817
Canada	13	2 717	2 155	2 521	3 679	151	403	706	1 030
Other industrial countries	21	3 276	5 466	8 015	9 376	172	368	635	1 189
Australia, New Zealand	15	1 563	2 976	5 372	6 939	100	221	394	947
South Africa	6	1 713	2 490	2 643	2 437	72	147	242	242

cont.

cont. (Table C:3)

Region and country	Number of firms[a] 1974	Employment 1960	Employment 1965	Employment 1970	Employment 1974	Total assets, mill.kr. 1960	Total assets, mill.kr. 1965	Total assets, mill.kr. 1970	Total assets, mill.kr. 1974
Less dev. countries	79	17 903	27 096	37 043	45 367	494	1 069	2 285	4 263
Africa	3	174	574	569	612	3	87	72	123
Tunisia, Marocko, Zambia	3	174	574	569	612	3	87	72	123
Asia	16	10 051	13 565	13 982	15 221	169	296	302	536
India	7	7 985	11 419	12 219	11 915	123	260	257	293
Pakistan, Ceylon, Thailand, Philipines, Malaysia, Singapore, Lebanon	9	2 066	2 146	1 763	3 306	46	37	45	243
Latin America	60	7 678	12 957	22 492	29 534	323	686	1 911	3 604
Argentina	10	1 241	1 377	2 674	2 559	43	80	281	288
Brazil	24	4 764	8 065	12 981	19 892	201	414	1 082	2 395
Colombia	5	319	531	1 048	930	10	23	76	104
Mexico	12	939	1 899	3 268	4 569	46	107	277	519
Chile, Peru, Uruguay, Paraguay, Venezuela, Equador, Jamaica	9	360	570	2 044	1 584	19	34	130	298
World	478	105 511	147 807	182 649	219 623	3 834	8 033	15 607	27 195

[a] Does not necessarily correspond to number of legal entities, since firms often consolidate over several affiliates in one country.

[b] EEC and EFTA grouping based on membership 1960-1970. Between 1970 and 1974 the following changes took place: Great Britain, Denmark and Ireland became members of an enlarged EEC in 1973. Iceland became a member of EFTA in 1970.

Table C:4 Manufacturing affiliate sales and trade by industry 1965, 1970, and 1974
Million kr

Industry	Sales			Exports			Exports to Sweden			Imports from Swedish parents[b]		
	1965	1970	1974	1965	1970	1974	1965	1970	1974	1965	1970	1974
Food, drink, tobacco	25	170	218	8	12	42	8	8	4	0	15	9
Textiles, apparel, leather and leather products	32	104	300	13	82	227	9	64	161	3	17	21
Pulp and paper	172	531	1 595	72	197	585	0	15	0	5	45	187
Paper products, printing and publishing	125	526	1 521	13	62	175	0	9	33	12	59	202
Chemicals, rubber, plastic products	1 007	1 397	2 407	63	131	319	7	27	58	37	91	218
Primary and fabricated metals	1 082	2 654	4 624	84	282	734	7	38	213	417	989	1 381
Machinery (except electrical)	4 096	6 726	10 016	563	1 322	2 913	59	123	298	330	591	929
Electrical machinery	1 391	2 131	5 448	53	132	467	23	47	126	192	368	1 168
Transportation equipment	296	934	3 058	56	369	1 286	0	26	38	123	340	1 186
Other manufacturing	301	866	1 973	88	189	505	5	41	79	9	21	49
All industries[c]	8 527	16 038	31 161	1 013	2 776	7 252	118	397	1 010	1 179[a]	2 677[a]	5 349

[a] The total exceeds the sum of all industries because it includes estimated values (50 and 140 million kr respectively) for one corporation. It has not been possible to allocate these values by industry.

[b] Imports from Swedish parents are approximately equal to total imports from Sweden, since affiliates have, for the most part, negligible imports from other Swedish firms.

[c] Due to rounding off the sum of all industries does not equal the total.

Table C:5 Manufacturing affiliate sales and trade by region in 1965 and 1970. Million kr

	Sales		Exports		Exports to Sweden		Import from Swedish parent [a]	
Region	1965	1970	1965	1970	1965	1970	1965	1970
Industrial countries	7 505	14 153	974	2 691	117	387	1 055	2 321
EEC	3 920	8 134	646	1 798	40	126	476	1 156
EFTA	1 645	3 370	207	676	71	235	239	674
of which								
Nordic countries	725	1 702	83	295	30	138	114	356
Other Europe	38	155	2	13	2	9	12	44
North America	1 520	1 850	117	196	4	14	203	328
of which								
United States	1 214	1 368	31	59	2	6	128	183
Other industrial countries	382	644	2	8	0	3	125	120
Less developed countries	1 022	1 885	39	85	1	10	74	216
Africa	42	48	36	41	1	7	0	2
Asia	394	430	0	9	0	1	14	24
Latin America	586	1 407	3	35	0	2	60	190
World [c]	8 527	16 038	1 013	2 776	118	397	1 179[a]	2 677[a]

[a] The total exdeeds the sum of all regions because it includes estimated values (50 and 140 million kr respectively) for one corporation. It has not been possible to allocate these values by region.

[b] Imports from Swedish parents are approximately equal to total imports from Sweden, since affiliates have, for the most part, negligible imports from other Swedish firms.

[c] Due to rounding off the sum of all countries does not equal the total.

Table C:6 Manufacturing affiliate sales and trade by country in 1974

Million kr

Region and country	Sales	Exports	Exports to Sweden	Imports from Swedish parent
Industrial countries	27 254	7 032	996	4 410
EEC[a]				
Belgium	2 397	1 822	71	448
France	3 686	599	56	415
Italy	1 970	214	22	279
Netherlands	1 787	800	67	332
West Germany	5 897	1 436	130	593
EFTA[a]				
Denmark[a]	1 389	452	185	197
Norway	830	211	124	198
Finland	1 132	247	134	341
Switzerland	81	14	4	2
Great Britain[a]	1 837	275	40	459
Austria	379	82	7	36
Portugal	370	289	97	2
Other Europe				
Spain	617	29	20	137
Ireland[a], Iceland[a], Greece, Turkey	59	17	9	6
North America	3 462	405	16	516
United States	2 481	95	11	245
Canada	981	310	5	271
Other industrial countries	1 361	140	12	449
Australia, New Zealand	1 099	138	12	384
South Africa	262	2	0	65
Less developed countries	3 910	223	14	939
Africa	150	134	0	1
Asia	629	2	0	118
of which				
India	370	2	0	17

cont.

cont.(Table C:6)

Region and country	Sales	Exports	Exports to Sweden	Imports from Swedish parent
Latin America	3 131	87	14	820
of which				
Argentina	246	8	3	12
Brazil	2 021	70	10	570
Columbia	92	2	0	3
Mexico	505	6	1	142
World[b]	31 163	7 252	1 010	5 349

[a] EEC and EFTA grouping based on membership 1960-1970. Between 1970 and 1974 the following changes took place: Great Britain, Denmark and Ireland became members of an enlarged EEC in 1973. Iceland became a member of EFTA in 1970.

[b] Due to rounding off the sum of all countries does not equal the total.

Table C:7 Book value of Swedish direct investment in manufacturing affiliates by industry in 1965 and 1970. Million kr

	Swedish direct investment	
Industry	1965	1970
Food, drink, tobacco	21	54
Textiles, apparel, leather and leather products	5	17
Pulp and paper	80	462
Paper products, printing and publishing	32	137
Chemicals, rubber, plastic products	470	605
Primary and fabricated metals	292	485
Machinery (except electrical)	1 812	2 811
Electrical machinery	399	629
Transportation equipment	43	202
Other manufacturing	163	333
All industries	3 317	5 735

Swedish direct investment is the book value of the Swedish parent's share in foreign affiliates' equity plus affiliate long term debts to Swedish parent (long term = in excess of 1 year).

Table C:8 Book value of Swedish direct investment by region in 1965 and 1970. Million kr

Region	Swedish direct investment 1965	1970
Industrial countries	2 960	4 964
EEC	1 521	2 633
EFTA	594	1 009
of which		
The North	174	368
Other Europe	18	69
North America	682	1 060
of which		
United States	567	659
Other industrial countries	145	193
Less developed countries	355	772
Africa	30	26
Asia	97	107
Latin America	228	639
World	3 317[a]	5 735[a]

Swedish direct investment is the book value of the Swedish parent's share in foreign affiliates equity plus affiliate long term debts to Swedish parent (long term = in excess of 1 year).

[a] Due to rounding off the sum of all countries does not equal the total.

Table C:9 Sales affiliates abroad by industry in 1965, 1970, and 1974

Industry[a]	Number of firms[b] 1965	1970	1974	Employment 1965	1970	1974
Food, drink, tobacco	8	15	15	112	159	129
Textiles, apparel, leather and leather products	19	24	33	121	83	74
Pulp and paper	27	67	85	163	392	758
Paper products, printing and publishing	8	7	34	46	35	502
Chemicals, rubber, plastic products	40	64	113	603	1 030	1 819
Primary and fabricated metals	71	137	149	834	2 049	2 641
Machinery (except electrical)	184	246	301	12 556	19 470	25 408
Electrical machinery	57	92	103	5 958	11 049	12 950
Transportation equipment	41	65	125	1 701	3 808	6 540
Other manufacturing	28	52	96	254	545	965
Mixed industry	100	136	173	2 478	4 082	3 951
All industries	583	905	1 227	24 826	42 702	55 737

[a] Industry affiliation of sales affiliates is by the main industry of the Swedish parent. The "mixed industry" category are affiliates of parents whose sales in any industry do not amount to at least 60 % of total sales.

[b] Number of firms does not necessarily correspond to number of legal entities, since firms often consolidate over several affiliates in one country.

Table C:10 Sales affiliates abroad by country in 1965, 1970 and 1974

Region and country	Number of firms[a] 1965	1970	1974	Employment 1965	1970	1974
Industrial countries	513	803	1 112	20 899	35 979	47 257
EEC[b]	156	260		7 954	13 357	
Belgium	20	34	42	834	1 116	1 281
France	30	55	99	1 498	2 819	3 747
Italy	14	26	34	3 248	4 591	6 473
Netherlands	22	38	52	527	1 054	1 981
West Germany	70	107	152	1 847	3 777	7 351
EFTA[b]	255	404		9 120	15 058	
Denmark[b]	54	77	124	1 850	2 714	4 195
Norway	53	90	121	1 472	2 653	3 755
Finland	27	41	65	1 323	1 900	2 730
Switzerland	28	61	62	693	1 359	1 926
Great Britain[b]	74	104	140	3 139	5 172	4 003
Austria	11	24	37	305	587	1 124
Portugal	8	7	8	338	673	728
Other Europe	23	28	32	997	1 235	1 457
of which						
Spain	11	12	20	523	717	984
Eastern Europe	3	3	2	75	69	71
North America	61	83	107	1 520	2 786	3 889
United States	45	63	83	1 220	2 273	2 873
Canada	16	20	24	300	513	1 016
Other industrial countries	14	28	37	1 302	35 657	2 617
Australia, New Zealand	12	19	20	597	1 742	893
South Africa	2	4	8	592	1 479	1 253
Japan	4	5	9	119	322	471
Less developed countries	70	102	114	3 927	6 723	8 430
Africa	7	13	13	122	229	269
Asia	17	26	31	877	1 351	1 778
of which						
India	4	5	4	501	421	900

cont.

cont. (Table C:10)

Region and country	Number of firms[a]			Employment		
	1965	1970	1974	1965	1970	1974
Latin America	50	63	70	2 928	5 143	6 433
of which						
Argentina	6	9	8	260	452	343
Brazil	6	8	16	311	542	981
Chile	4	5	10	187	256	345
Colombia	7	7	4	714	990	988
Mexico	7	8	10	448	1 193	1 488
Peru	8	11	8	398	384	428
World	583	905	1 226	24 826	42 702	55 737

[a] Does not necessarily correspond to number of legal entities, since firms often consolidate over several affiliates in one country.

[b] EEC and EFTA grouping based on membership 1960-1970. Between 1970 and 1974 the following changes took place: Great Britain, Denmark and Ireland became members of an enlarged EEC in 1973. Iceland became a member of EFTA in 1970.

Table C:11 The 20 largest Swedish multinational manufacturing firms in 1978[a]

Name of company	Total employment	Foreign affiliate employment	Age of oldest manuf. affiliate	Main products
Electrolux	75 630	47 690	1921	Household appliances, office machines
SKF	54 470	44 290	1910	Roller bearings, steel
L M Ericsson	66 390	33 890	1911	Telephone stations, exchanges, equipment
Sandvik	28 330	15 150	1922	Steel, steel manufactures
Volvo	57 290	10 030	1960	Motor vehicles, machinery
STAB (Sw.Match)	23 250	13 680	1912	Building materials, packaging, matches
Atlas Copco	17 660	12 040	1943	Pneumatic drills, compressors
Alfa Laval	17 760	10 890	1897	Separators, dairy and farm machinery
AGA	15 370	9 410	1913	Gas and gas energy (heating, freezing, welding)
ASEA	40 600	9 100	1916	Electric equipment, engines, turbines
ESSELTE	13 950	7 400	1965	Office equipment, printing, publishing
Svenska Fläkt	11 510	7 060	1934	Air conditioning
Saab-Scania	39 250	6 600	1958	Motor vehicles
SCA	15 650	5 150	1960	Paper and allied products
Astra	7 060	3 720	1942	Pharmaceuticals

Cont. (Table C:11)

Name of company	Total employment	Foreign affiliate employment	Age of oldest manuf. affiliate	Main products
ESAB	5 640	3 460	1933	Electrical welding machinery
PLM	8 580	3 190	1969	Packaging (metal, glass, paper)
Euroc	10 940	3 050	1960	Cement, machinery
Monark	4 190	3 030	1948	Bicycles
Gränges	15 640	2 520	1957	Steel, steel constructions, copper and aluminum products

[a] Based on the size of foreign affiliate employment.

Source: 1978 Company Annual Report. Information on the age of foreign manufacturing comes from the IUI survey.

BIBLIOGRAPHY

Alchian, Armen A. and Harold Demsetz, "Production, Information Costs, and Economic Organization," The American Economic Review, December 1972.

Berry, Charles H., "Corporate Growth and Diversification," The Journal of Law and Economics, October 1971.

Board of Trade Journal, HMSO, London (various issues)

Buckley, Peter J. and Mark Casson, The Future of the Multinational Enterprise. Macmillan, London, 1976.

Burenstam Linder, Staffan, An Essay on Trade and Transformation. Almqvist & Wicksell, Stockholm, and John Wiley & Sons, London, 1961.

Business International, The Effects of U.S. Corporate Foreign Investment 1960-1970. Business International Corporation, New York, 1972.

Carlsson, Bo and Åke Sundström, Den svenska importen av industrivaror från låglöneländer. Industriens Utredningsinstitut, Stockholm, 1973.

Carlsson, Bo and Lennart Ohlsson, "Structural Determinants of Swedish Foreign Trade. A Test of the Conventional Wisdom," European Economic Review, February 1976.

Caves, Richard E. and Ronald W. Jones, World Trade and Payments - An Introduction. Little Brown and Company, Boston, 1973.

Caves, Richard E., "International Corporations: The Industrial Economics of Foreign Investment," Economica, February 1971.

-----, "Causes of Direct Investment: Foreign Firms' Shares in Canadian and U.K. Manufacturing Industries," Review of Economics and Statistics, August 1974.

Coase, R.H., "The Nature of the Firm", Economica, November 1937.

Cohen, Benjamin J., Jorge Katz and William T. Beck, "Innovation and Foreign Investment Behavior of the U.S. Pharmaceutical Industry," NBER Working Paper 101, August 1975.

Corden, W.M., "The Theory of International Trade", in John H. Dunning, ed., Economic Analysis and the Multinational Enterprise. Allen & Unwin, London, 1974.

Dunning, John H., Studies in International Investment. Allen & Unwin, London, 1970.

-------, "The Determinants of International Production," Oxford Economic Papers, November 1973.

-------, "Trade, Location of Economic Activity and the MNE: A Search for an Eclectic Approach," in The International Allocation of Economic Activity edited by Bertil Ohlin et al., Macmillan, London, 1977.

Finnan, William F., "The International Transfer of Semiconductor Technology through U.S.-based Firms," NBER Working Paper 118, December 1975.

Frank, Robert H. and Richard T. Freeman, "Multinational Corporations and Domestic Employment," unpublished paper, Cornell University.

------, Distributional Consequences of Direct Foreign Investment. Academic Press, New York, 1978

Goodman, John L., Jr., "Is Ordinary Least Squares Estimation with a Dichotomous Dependent Variable Really that Bad?" Working Paper 216-23, The Urban Institute, Washington, D.C., September 1976.

Gruber, William and Dileep Mehta and Raymond Vernon, "The R&D Factor in International Trade and International Investment of the United States Industries," Journal of Political Economy, February 1967.

Hirsch, Seev, Location of Industry and International Competitiveness. The Clarendon Press, Oxford, 1967.

------, "An International Trade and Investment Theory of the Firm," Oxford Economic Papers, July 1976.

Horst, Thomas, "A Theoretical and Empirical Analysis of American Exports and Direct Investment," Unpublished Ph.D. thesis, University of Rochester, 1969.

-----, "The Industrial Composition of U.S. Exports and Subsidiary Sales to the Canadian Market," American Economic Review, March 1972.

-----, "Firm and Industry Determinants of the Decision to Invest Abroad: An Empirical Study," The Review of Economics and Statistics, August 1972. (b)

-----, "American Exports and Foreign Direct Investment," Discussion Paper Number 362, Harvard Institute of Economic Research, May 1974; also in Bergsten, Fred C., Thomas Horst and Theodore H. Moran, American Multinationals and American Interests. Brookings Institution, Washington, D.C., 1978.

-----, At Home Abroad. A Study of the Domestic and Foreign Operations of the American Food-Processing Industry. Ballinger, Cambridge, 1974.

Hufbauer, Gary C., "The Multinational Corporation and Direct Investment," paper presented at the Conference on Research in International Trade and Finance at Princeton University, March 1973.

------, "The Impact of National Characteristics and Technology on the Commodity Composition of Trade in Manufactured Goods," in Raymond Vernon, ed., The Technology Factor in International Trade. Columbia University Press, New York, 1970.

Hufbauer, Gary C. and Michael F. Adler, Overseas Manufacturing and the Balance of Payments. Tax Policy Research Study No. 1. Treasury Department, Washington, D.C., 1968.

Hymer, Stephen H., The International Operations of National Firms: A Study of Direct Foreign Investment. Ph.D. thesis, M.I.T. 1960 and M.I.T. Press, Cambridge, Mass., 1976.

Industri. Del I., SCB, Stockholm (different years).

Intriligator, Michael D., Econometric Models, Techniques and Applications. North Holland, Amsterdam-Oxford, 1978.

"Internationella företag - kartläggning per 31 december 1974", SCB, Stockholm.

Isard, Walter, Location and Space Economy, M.I.T. Press, Cambridge, Mass., 1956.

Johnson, Harry, Comparative Cost and Commercial Policy Theory for a Developing World Economy. Wicksell Lectures, Almqvist & Wicksell, Stockholm, 1968.

-------, "The Efficiency and Welfare Implications of the International Corporation," in Charles P. Kindleberger, ed., The International Corporation, M.I.T. Press, Cambridge, 1970.

Jones, Ronald W., "The Technology Factor in the Theory of International Trade," in Raymond Vernon, ed., The Technology Factor in International Trade. Columbia University Press, New York, 1970.

Kindleberger, Charles P., American Business Abroad. Six Lectures on Direct Investment. Yale University Press, New Haven, 1969.

Knickerbocker, Frederick T., Oligopolistic Reaction and Multinational Enterprise, Graduate School of Business Administration, Harvard University, Boston, 1973.

Krainer, Robert E., "Resource Endowment and the Structure of Foreign Investment," Journal of Finance, March 1967.

Kravis, Irving B., Alan W. Heston and Robert Summers, "Real GDP Per Capita for More than One Hundred Countries," The Economic Journal, June 1978.

Lipsey, Robert E. and Merle Yahr Weiss, "The Relation of U.S. Manufacturing Abroad to U.S. Exports: A Framework For Analysis," 1969 Proceedings of the Business and Economic Statistics Section, American Statistical Association.

------, "Exports and Foreign Investment in the Pharmaceutical Industry," NBER Working Paper 87, January 1976.

------, "Exports and Foreign Investment in Manufacturing Industries," NBER Working Paper 131, May 1976.

Lipsey, Robert E., Irving B. Kravis and Romualdo A. Roldan, "Do Multinational Firms Adapt Factor Proportions to Relative Factor Prices?" NBER Working Paper 293, October 1978.

Lund, Harald, Svenska företags investeringar i utlandet. Sveriges Industriförbund, Stockholm, 1967.

Lundberg, Lars, Handelshinder och handelspolitik - studier av verkningar på svensk ekonomi. Industriens Utredningsinstitut, Stockholm, 1976.

Lundgren, Nils, Internationella koncerner i industriländer - samhällsekonomiska aspekter. Betänkande av koncentrationsutredningen, SOU 1975: 50, Stockholm, 1975.

McManus, J.C., "The Theory of the Multinational Firm," in G. Pacquet, ed., The Multinational Firm and the Nation State. Collier MacMillan, Canada, 1972.

Meyerson, Per-Martin, Företagens utländska direktinvesteringar - motiv och sysselsättningseffekter. Sveriges Industriförbund, Stockholm, 1976.

Mundell, Robert A., "International Trade and Factor Mobility," American Economic Review, June 1957.

Nationalräkenskaperna, SCB, Stockholm.

Ohlin, Bertil, Interregional and International Trade. Harvard University Press, Cambridge, Mass., 1933.

Ohlsson, Lennart, Svensk verkstadsindustris internationella specialisering. Industriens Utredningsinstitut, Stockholm, 1976.

Penrose, Edith, The Theory of the Growth of the Firm. Blackwell, Oxford, 1959.

Reddaway, W.B. et al., Effects of U.K. Direct Investment Overseas: An Interim Report. Cambridge University Press, Cambridge, 1967.

--------, Effects of U.K. Direct Investment Overseas: Final Report. Cambridge University Press, Cambridge, 1968.

Rosen, Sherwin, "Learning by Experience as Joint Production," The Quarterly Journal of Economics, August 1972.

SAF:s Matrikel, Svenska Arbetsgivareföreningen, Stockholm.

Samuelsson, Hans-Fredrik, Utländska direkta investeringar i Sverige. Industriens Utredningsinstitut. Stockholm, 1977.

Scherer, F.M., "Firm Size, Market Structure, Opportunity, and the Output of Patented Inventions," American Economic Review, December 1965.

Statistical Abstract of the United States.

Stevens, Guy, V.G., "The Determinants of Investment", in John H. Dunning, ed., Economic Analys and the Multinational Enterprise. Allen & Unwin, London, 1974.

Stobaugh, Robert, et al., "U.S. Multinational Enterprises and the U.S. Economy: A Research Study of the Major Industries that Account for 90 Per Cent of U.S. Foreign Direct Investment in Manufacturing," Harvard Graduate School of Business Administration, Boston, January 1972.

Survey of Current Business, U.S. Department of Commerce, Washington D.C. (various issues).

Swedenborg, Birgitta, Den svenska industrins investeringar i utlandet. Industriens Utredningsinstitut, Stockholm, 1973.

----------, "Svenska, amerikanska och engelska utlandsinvesteringar: några jämförelser," in Nils Lundgren, ed., De internationella koncernerna och samhällsekonomin. Rabén & Sjögren, Stockholm, 1975.

----------, "Den svenska industrins investeringar i utlandet 1970-1974: En preliminär rapport". Industriens Utredningsinstitut, Forskningsrapport nr 5, 1976.

Svensk Industrikalender, Sveriges Industriförbund, Stockholm.

Svenska Aktiebolag, Norstedt & Söner, Stockholm

Tell, Jeremy H., "Offshore Production by American Multinational Corporations -- A Substitute for Manufacturing Activities in the United States," Unpublished Ph.D. thesis, New York University, 1976.

Trade and Industry, HMSO, London (various issues).

U.N. Yearbook of International Trade Statistics.

U.S. Direct Investment Abroad 1966, Part II, U.S. Department of Commerce, Washington, D.C.

U.S. Tariff Commission, Implications of Multinational Firms for World Trade and Investment and for U.S. Trade and Labor, Report to the Committee on Finance of the United States and its Subcommittee on International Trade, TL Publication 537, Washington DC, 1973.

Utrikeshandel. Del II, SCB, Stockholm (different years).

Vernon, Raymond, "International Investment and International Trade in the Product Cycle, "Quarterly Journal of Economics, May 1966.

Vernon, Raymond, Sovereignty at Bay. The Multinational Spread of U.S. Enterprises, Basic Books, New York, 1971.

Yoshino, M.Y., Japan's Multinational Enterprises. Harvard University Press, Boston, 1976.

Publications in English
1979

The Multinational Operations of Swedish Firms. An Analysis of Determinants and Effects. Birgitta Swedenborg. 287 pp.

A Comparative Study of Complete Systems of Demand Functions. Anders Klevmarken. Booklet No. 101. 27 pp.

Frontier Production Functions and Technical Progress. A Study of General Milk Processing in Swedish Dairy Plants. Finn R. Førsund and Lennart Hjalmarsson. Booklet No. 100. 18 pp.

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A Micro-to-Macro Model of the Swedish Economy (ed G Eliasson). IUI Conference Reports 1978:1. 240 pp.

Publications in Swedish*
1979

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The Multinational Operations of Swedish Firms

International investment and the operations of multinational companies are phenomena which – because of their growing importance in the world economy – have attracted considerable interest in the last decade or so. This book gives careful theoretical and empirical treatment of some of the issues that lie at the heart of the public policy debate and that have been central themes in the economic literature. The focus is on 1) what determines international production by national firms, and 2) what the effect is on home country trade and employment of allowing foreign production.

The empirical analysis uses unique census data on Swedish manufacturing firms and their foreign affiliates. This makes it the first study in which hypotheses regarding the determinants of international production have been tested on data for the outward investment of a country other than the U.S. Since hypotheses have been developed mainly on the basis of the U.S. experience, comparative study should be an important step toward finding a "general" theory of foreign investment.

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