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THE INTERNATIONAL FIRM: A Vehicle for Overcoming Barriers to Trade and a Global Intelligence Organization Diffusing the Notion of a Nation

by

Gunnar Eliasson

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Abstract

The multinational firm (MNF) is introduced as the intersection between trade theory and the theory of the firm. I show that economies of scale associated with various knowledge inputs have made it possible for firms to grow large through internationalization and, once large, staying competitive and large. Internationalization is a technique of both overcoming barriers to trade, and of efficient learning to stay competitive.

International firms are increasingly becoming large and highly mobile carriers of industrial knowledge embodied in teams of humans. With barriers to trade and factor movements further reduced in Europe the first reason for globalization will decrease for firms located inside the internal market, but intensified technological competition will make the second factor increasingly important, constantly shifting the intelligence locus of the business organization to the markets where the most advanced industrial knowledge is being exhibited in competition. Europe will become such a locus of competition and competence allocation to the extent "it" lives up to its ambition to deregulate markets, and especially the markets for ownership and control. In general global markets are seen as a vast source of business opportunities and the firm as a local source of competence to exploit the opportunities.

The more sophisticated the firm the more important the knowledge factor and the less well defined the national origin of rents from engaging in international trade and production. Large international firms, building their competitiveness on a unique, tacit competence acquired through successful participation in the global market game, with subsidiaries in many countries, make the competence base of industrial nations internationally mobile within their organization and more responsive to the rents from trade. National comparative advantages become dependent on trade itself, blurring the notion of the industry of a nation.

If foreign international firms, for instance, are more competent in capturing, or imitating new innovations and carrying them into full scale industrial production more rapidly than domestic producers, the large U.S. scientific and engineering research community may in fact work as a competitive disadvantage for domestic U.S. industry.

In looking for genuine comparative advantages in advanced industrial nations we should find them first of all in the policy competence of the nation to make itself attractive for profitable, but mobile human embodied competence capital.

1 The Theory of International Trade Needed to Understand Market Integration of National Economies

Ever since Ricardo's "Principles" was published in 1817 the theory of "comparative advantage" has been the cornerstone of what is still called the "modern theory of international trade". International trade theory elaborated on this notion makes nation locked comparative advantages the origin of trading rents. It places the "welfare" of the nation in focus. It rests on five fundamental assumptions.

(1) No economies of scale in production.

(2) No external effects.

(3) No nation exercises any monopoly power in foreign trade i.e. does not affect the world market price level.

(4) Markets are competitive i.e. marginal conditions are satisfied.

(5) There is full employment of all resources within each national economy.

Then free trade equalizes product prices among nations and can be demonstrated to be optimal, welfare maximizing policy for each nation.

Classical trade theory was gradually refined within a static, general equilibrium setting. It has strongly influenced trade policy through the postwar years, partly, I believe, through its capacity to come up with "acceptable policy conclusions". It has influenced analysis of and debate on policy as regards the internal EC market. It may seem very surprising to non-experts in the field that a theory that contradicts a whole range of well established facts, considered very important, can exercise such an intellectual stronghold for such a long time, influencing political decisions in a not negligible way. To understand that and to see what intellectual change is needed to understand what is going on a brief survey of our intellectual heritage is also needed.

There are three classical theorems to remember. The factor-proportions, or Heckscher (1919) – Ohlin (1933) model demonstrated that with comparative advantages based on differential endowments of factor supplies, and no factor movements, nations tended to concentrate production (through trade) in lines

of business which used relatively more of their relatively abundant factor resources. Stolper-Samuelson (1941) demonstrated rigorously that trade tended to equalize factor prices under similar conditions; Rybczynski (1955), finally, showed that a partial (exogenous) increase in one factor, say capital, assuming fixed prices means that capital intensive production will increase – in that nation – and that an absolute decline in labor intensive production will have to follow to keep the factor price of capital (the rate of return on capital) from falling. The latter result occurs because the increase in capital intensive production will at least use an additional positive amount of labor. In terms of my argument, the Rybczynski (1955) theorem tells that if the firms of a nation experience an (exogenous) increase in available human competence capital a decrease in simple labor (hours) and machine intensive production will have to occur for the rate of return to the firms on that competence capital not to decrease. For the rents on educational investments, or on investments in R&D to stay high enough to stimulate further investments in the same type of capital accumulation, simple, labor intensive production will have to be reduced. If the marginal contribution to economic growth of investments in knowledge is higher than investments in simple hardware capital it appears reasonable to conclude that rational economic policies should be designed to achieve that balance. The Rybczynski theorem is, however, static and requires a dynamic reformulation to allow such conclusions. In fact, if endogenous investment and saving are allowed (only in a two-period case!) the Rybczynski results do not hold up (Naqui 1987).

This is still "nationalistic" economic theory based on nationally controlled factor endowments, a theory that makes it possible to reason as if the national economy is under some central policy control. Was this ever reasonable? Is it now? Will it be in a different Europe? Suppose, for instance, that the accumulation of competence capital is costly and subjected to strongly diminishing returns, while the services of the application of that competence capital can be captured by other firms or firms in other nations. Couldn't such national technology programs of the kind we see in mature nations, designed to increase the competitiveness of their industries be counterproductive and rather decrease national competitiveness. I will follow this idea through this essay.

Burenstam-Linder (1961) suggested that rich nations with sophisticated consumption patterns would develop a comparative advantage in producing sophisticated goods. He thereby suggested one thesis of this paper, namely the importance of accumulated ("learned") industrial competence as a source of comparative advantages or unique firm knowledge, or – which will be my term – of firm competitiveness. More disturbing than that was Verdoorn's observation in the early 60s that specialization and exchange took place more within than between sectors, an observation that directly contradicted the dominant Heckscher–Ohlin model. These results have then been confirmed to the extent that they can no longer be neglected.

Dynamic factors, all too obvious to be disregarded in a trade context complicate things further. Firms, and notably international firms that transgress national borders with factor movements within their administrative systems, cannot exist in the classical trade model, and I will introduce them below by gradually dropping some of its assumptions. The Rybczynski theorem reformulated in a dynamic context is especially important in view of the new European perspective. Part of this essay is therefore devoted to formulating a theory that allows us to keep the Rybczynski results in a world economy populated by international firms, engaged in dynamic technological competition in global markets. We will find then that the notion of competitiveness of firms is more adequate than comparative advantages, since it relates directly to a key decision variable of the firm, the rate of return (Eliasson 1972).

This paper attempts no revision of the mathematical theory of international trade. It only makes an empirical case for reallocation of theoretical brain power, so that theory will enlighten, not confuse, the discussion on the economics of EC 1992.

Allowing for the Firm in Pure Trade Theory

A number of more or less general, computable general equilibrium models have emerged in recent years. The general results from the traditional Heckscher–Ohlin type of applications have been that the welfare gains from changes in trade policy are small and, in terms of the precision of these

models, politically and practically insignificant (Shoven–Whalley 1984). However, none of these models recognize scale effects in trade. In general they suffer from the deficiency of all general equilibrium models, that adjustments take place over an exogenously given structure, while the interesting problem is to explain the change in structure. Under such numerical assumptions the potential effects from adjustments will be small and the risks of drawing erroneous conclusions large. Norman (1989) for instance shows that Sweden won't gain much from joining the EC, compared to Sweden's past growth performance. Sweden will, however, lose, in terms of lost growth in output from not joining EC. This loss, however, is not very large, because the growth effects of the internal EC market are those computed by a static general equilibrium model, which cannot, on the basis of its assumptions, create more than small effects. The Norman model, like most computable equilibrium models of international trade allows for no factor movements across borders, like investments. The shifting of investment out of Sweden into the EC region within multinatural corporations, reducing manufacturing growth in Sweden, is exactly what may create large growth effects and should worry Swedish politicians (Braunerhjelm 1990).

Caves (1971) introduced the international corporation into general equilibrium trade theory as an exporter of sector-specific capital, that equates rates of return between countries. He observed, however, that the market imperfection called an international corporation cannot exist in equilibrium. Trade policy or welfare analysis on the other hand becomes very difficult, perhaps not possible when the economy is not in equilibrium.

In the last few years a so-called "new" theory of international trade has expanded the notion of comparative advantage by (1) allowing for specialization through economies of scale (Krugman 1983) and (2) incorporating some effects on domestic competition of international integration. This literature [dropping assumptions (1) and (2)] models competition among the few. A typical market imperfection based on economies of scale, or scope,[1] from

[1] Trade theory often uses the term increasing returns to scale, when some would prefer to use the more general term "scope". I don't think my argument needs any further precision on this point, but for the sake of terminology I will introduce an exact and unnecessarily restrictive definition below, when the concept of knowledge has been introduced. This definition will allow me to keep the textbook meaning of "increasing returns to scale".

unique knowledge is the firm itself. Introducing the firm in international trade theory fundamentally changes its analytical design. It is not only a matter of allowing for factor mobility through markets, as is conventionally implied (see e.g. Caves – Jones 1977, Ch. 10). It means allowing for factor mobility within hierarchies (multinational firms) making national comparative advantages indeterminate.

A general theory of imperfect competition among a limited number of agents was called for already by Plummer (1934) and is needed if we want to account for the presence of multinational firms. The existence of the international firm is demonstrated theoretically as the answers to:

a) why trade
b) why a firm

Hence the theory of the multinational firm is to be found in the intersection between international trade theory and the theory of the firm.

While the market imperfection called a firm has to be based on some unique advantage (a patent, unique "tacit" knowledge, etc.), locational considerations determine its geographical distribution of activities. However, both these considerations have already been recognized in trade theory. A third factor, namely internalization, or the internal superiority of the multinational organization, over the market – in Coasian (1937) terms – to process information is the missing link pointed out by Hymer (1960, 1970). It is what makes the multinational firm emerge as a viable business entity. Helpman (1984) accepting that most trade is intrasectoral, adds that the bulk of foreign trade is in fact intra firm, within the MNC and based on economies of scale. He observes that there are some partial analyses of foreign investment in an international trade perspective, notably Caves (1971). He wants to merge the two strands of theory, without leaving the equilibrium framework. Allowing for economies of scale pushes you outside the equilibrium framework, but assuming that free entry – as in Baumol–Panzar–Willig (1982) – brings about zero profits, takes you back in, but only if you can also assume economies of scale to be based on firm-specific assets associated with marketing, management, and product-specific R&D, the competence service of which can be costlessly communicated to all parts of the multinational firm. This is really not an acceptable assumption in activities that draw large

resources, and when the asset specificity, or scale factor that generates monopoly rents is acquired in a learning-by-doing or joint production way (Arrow 1962, Krueger 1968, 1974, Rosen 1972, Findlay-Kierzkowsky 1983, Rivera-Baliz–Romer 1989).

Teece (1986) and Galbraith–Kay (1986) elaborate on the notion of internal firm synergies within a transactions cost framework. Ethier (1982, 1986) takes a (complex) contract theoretic approach. A number of studies have emphasized the scale advantages of R&D costs from internationalization (Swedenborg 1979, deBondt-Stenwaegen-Vengelers 1988), or the monopoly positions created by firm specific assets (Helpman 1984) or learning through experience (Rosen 1972, Swedenborg 1989). These steps towards more relevance in trade theory all point towards the ultimate step that the firm itself is not well defined in the network of all other firms (Mattsson 1985) called a market. Hence, in a dynamic international market with multinational firms the national economy is no longer well defined. Hence, the theory of the firm and of international trade still awaits the credible merger that statistical observation demands (Eliasson 1987a, 1989, Eliasson–Lundberg 1989). In my world economy, firms – not nations – compete from positions of unique competence in global markets, learning methods being their main competitive advantage (see Eliasson 1988c). This evolutionary perspective on trade automatically pushes us outside the classical, static model without, therefore, diminishing its predictive power for the restricted problems it was designed for.

Conclusions on Theory

The above criticism may be unduly destructive. It is to the extent that pure theorists insist on giving advice on policy. With trade driven by technologically based economies of scale within multinational firms, markets will not only be imperfectly competitive. The nature of this scale-driven competitive process will not only determine the macroeconomic and distributional effects of trading. Allowing across border operations of firms also redefines the notion of a national economy as a "politically controlled economic system". There is very little one should say on national economic welfare and policy on the basis of theory that does not explicitly recognize these complications for

the policy maker of trade and factor mobility within transnational administrative systems, called multinational firms.[2] The policy maker will easily be misled.

I will now take two steps towards improving the model. First I will make the attempt on the part of the firm to overcome the Smithian market constraint by gaining access to global markets, i.e. overcoming trade barriers, the driving force behind becoming international. Second, I will make access to the global pool of industrial knowledge through organizing themselves as international learning or intelligence businesses, the critical firm technology of staying competitive, once big and international. More concretely; in the new European policy context the important question is how market competition will be organized. This is a matter both of what policies European nations decide on and of how business firms organize themselves in response to these policies. Will firms organize themselves to compete with exports into an open, internal European market, will they climb into a closed Fortress Europe through direct investments or will they have to be established in the rapidly expanding open European market anyhow, in order to learn from the best competitors, which will all be there.

With non-perfect markets conventional aggregation assumptions do not hold up. An additional requirement on good trade theory, hence, is explicit aggregation of all firms through markets to the macro level. For trade theory to survive in that transformation a way has to be found to characterize national boundaries operationally during the aggregation. Apparently national boundaries will to some extent be posted by market contacts, but

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[2] For the sake of expositional clarity, this is what happens when a few critical assumptions of a static, general trade theory are relaxed.

First, since the pure theory of international trade allows for no market imperfections there is no room for the phenomenon called a firm. Firms arise out of economies of scale (assumption 1 above), possibly creating external effects (assumption 2), disrupting the assumption of competitive markets (assumption 4) and perhaps causing resources to be temporarily unemployed (assumption 5).

Second, assumption (4) is extremely strong, since it embodies the notion that all agents are perfectly informed about each other, allowing for a state of full information, removing all interest in the process of learning and the competitive process leading (perhaps) to a state of perfect information (equilibrium). This state is not feasible if information costs have to be expended to learn about the equilibrium and/or if comparative advantages are dependent on the consequent trade, i.e. on the solution to the trade problem of the classical trade model.

increasingly they will be drawn right through the administrative system called the international firm. I propose to handle this problem through a generalized Salter curve analysis. I will do this by representing each market by a set of Salter curves exhibiting each firm or unit of the firm relative to the other firms by its productivity or rate of return (as in the Swedish micro-to-macro model; Eliasson 1985, 1989b. See also Eliasson–Lundberg 1989). Braunerhjelm (1990) has collected such Salter structures representing a cross section of comparative productivities of the Swedish and the foreign operations of Swedish multinational firms. The slope (potential and actual) of these curves for each market represents potential competition. The relative productivities in the national economy and in the rest of the world, preferably translated to relative rates of return, should be a decisive factor behind the relative distribution of firm investment between the national and the foreign economy. The curves are upgraded through investment, entry and exit. To make the performance upgrading interesting, investment in knowledge (learning) has to be made explicit. International integration occurs through the merging of such curves directly in markets or within multinational firms. Since this paper is concerned with the multinational firm rather than with national economic problems, I will return to the modeling problem briefly below. To discuss the MNC in a European perspective this theoretical framework has to be used.

There is an apparent "competitive" conflict between the two "strategies" of the international firm. If the large firms succeed in staying big and dominant they will prevent small, competing firms from becoming dominant.[3] For

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[3] At this point I should explain my use of the term "increasing returns to scale". Increasing returns to scope is clearly what my general argument is about. But if you want to carry out the argument in more precise and narrow terms, we can do it in terms of "increasing returns to scale". Suppose, following Romer (1986, p. 1015), that the production function of a firm $F(k_i, K, x_i)$ is concave as a function of k_i and x_i for any fixed value of K. K is the level of knowledge. K is a capital good with an increasing marginal product. As long as there are diminishing returns in the R&D activities that create K, the static trade model will have a finite solution, and the peculiar assumptions needed by Arrow (1962), and elaborators, limiting the rate of growth of output to the growth in the labor force, can be avoided. This establishes contact with trade theory. Assuming F( ) to be homogeneous of degree one as a function of (k_i, x_i) when K is constant then is an insignificant further restriction. Given that, for any $\phi > 1$.

$$F(\phi k_i, \phi K, \phi x_i) > F(\phi k_i, K, \phi x_i) = \phi F( ).$$

instance, the big firm may simply obtain new know-how by acquiring a successful, small competitor. I will try briefly to sketch this competitive game.

The MNC as a transnational administrative system emerges on the basis of superior internal coordination and innovative efficiency over the market. As mentioned this Coasian (1937) transactions cost explanation is there in one form or another in recent MNC literature. I extend this explanation by defining the transactions cost superiority in terms of a superior internal capacity (1) to reach foreign markets through controlled subsidiaries and (2) to tap the international pool of knowledge and put it to effective use within the firm hierarchy. If the knowledge is tacit and/or transfer costs prohibitive a multinational organization is the only viable solution for firms competing in markets where new knowledge is generated internationally. This is the case for a large part of Swedish manufacturing industry. Samuelsson (1977, pp. 53 ff) observed this tacit nature of the specific firm competence early. Tacit knowledge gives "proprietary character" to knowledge, when it can't be protected by law. If not externally communicable, it may be communicable internally, within the transnational organization. While a firm with specific knowledge assets, for instance, would never transfer critical know-how to another firm, cooperating in a joint venture, it may transfer it to a controlled subsidiary, thereby removing it from its present location, or decreasing its economic value in its original location, since it has also been established in the subsidiary. This makes the transaction in know-how costly, contradicting Helpman's (1984) assumption. The main consequence is that the knowledge is controlled by the owner of the multinational firm, even though the rents may be distributed differently over nations. Take for instance, the recent ASEA Brown Bovery merger. The internal reallocation of knowledge within the new

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F now exhibits increasing returns to scale in K. This is one way of exactly interpreting the term scale in my argument above. In the growth process of the new firm, K is the know–how created, say in the R&D department that can be exploited by blowing up the size of the firm. In the second case of the already giant MNC, the ability to maintain a large K, needed to stay competitive, requires a large global scale of all other factors. In short then I don't need the distinction between economies of scope and of scale for my argument. It has become traditional to use the term "scale" in the new trade literature. The scale argument gives my argument a more precise analytical meaning, covered by the economies of scope that I am really talking about. But going from "scale" to "scope" will probably only strengthen my argument. So I will carry on with the term "scale".

ABB hierarchy will probably be very large, as will the international redistribution of "comparative advantages".

The size of the multinational firm poses a market concentration problem for the policy maker in the small economy. But this idea is wrongly conceived. The problem is rather one of vulnerability and loss of policy control. Look at Table 3 and the extreme integration of the Swedish manufacturing sector with the rest of the world through a few large large MNC with internally mobile resources.

With business rents being determined by the unique competence residing within the firm (Eliasson 1988c) also the distribution of rents from trade will depend on the international distribution (within the firm) of that knowledge. That distribution must depend on where rents are best earned. The industrial knowledge base of a nation, hence, becomes internationally mobile within its MNC. This mobility will increase with the dominance of MNC in the world economy, and especially so, the more easily such competence moves within firm hierarchies relative to in markets. However, the distribution of this knowledge base also determines the comparative advantages of the nation which have now become dependent on trade and the gains from trade itself. The production system has lost its national definition. This, however, only matters if this mobility of the industrial base is significant in some relevant policy meaning. But small changes (see below) can cause significant instabilities and shifts in macroeconomic growth performance.

2. Generating Economies of Scale through Overcoming the Market Constraint

One of the famous ideas of economics is Adam Smith's theorem that the division of labor depends on the size of the market. Hence, growth in output is bounded by market size or demand, a notion that Marx later built upon to argue that industrial nations, being superior to other nations in exploiting a virtually unlimited productivity potential, tended to turn imperialistic (monopolistic) in order to expand their markets [thus invalidating assumption (3)]. Let me go through this argument in terms of four complicating factors; two in this section, and two in the fifth section.

First Complication – Overcoming the Market Constraint through Globalization

The image of Adam Smith's theorem is the classical notion from general equilibrium theory that economies of scale breed monopolies and concentration, a notion picked up by the elderly Schumpeter (1942). Schumpeter – with dismay – envisioned superior routinized innovative behavior that would compete the small entrepreneurs out of the market, generate excessive concentration and leave one superior player in each market. A number of not desired political consequences that do not relate to the problem of this paper followed.

To begin with I keep the – misconceived – notion of a nationally bounded market, meaning a physically restricted capacity to consume or make use of output, even at a zero or negative price. In this setting the organizing technology to operate globally gives the international firm access to the world market. Through an international R&D, production and marketing organization the international firm achieves lower "transactions" costs per unit of output, compared to the alternative solution of producing for exports from a domestic base.[4] It makes the international firm a vehicle for overcoming barriers to trade, in a broad sense. This is the demand argument

Overcoming the market limitation in the sense of Adam Smith and Karl Marx, takes place through the exploitation of economies of scale in global organizational technique. Building a controlled international market and distribution network that links up directly with the final customer is one such organizational technique, that generates sufficient demand volume to build large plants and support extensive R&D (Swedenborg 1979).

This internationalization has made it possible for small but advanced industrial nations like Sweden, Switzerland and the Netherlands (see Table 1) to overcome the market constraints and, nevertheless, create very large business organizations. The consequence has been an extreme concentration of the production of the entire economy to a few giant firms (see Table 2 and Figure 1 and Eliasson 1986b). This means that a huge domestic market, while

[4] This conclusion is further reinforced when we introduce "quality of output" below.

initially a competitive advantage for U.S. firms, may in fact be a long-term disadvantage, since U.S. firms in general learned late to go multinational. It is also interesting to observe (Pratten 1976) that even though the firms defined as financial organizations (groups, combines) were then significantly larger in the U.K. than in Sweden, the Swedish plants were much larger and much more productive. By gaining access to global markets through their international distribution system, Swedish firms could enjoy economies of scale in production at home. In fact (Carlsson 1988) Swedish plants are not small compared to U.S. or Japanese plants, only compared to West German plants.

Second Complication – Competition with Product Quality

Introducing economies of scale in process performance "engineered" through technological advance, is a natural extension of the classical trade model. Surprisingly it has taken until the last few years to see this elaboration occur. Such a notion is the basis for technological competition (Spencer - Brander, 1983), that has stopped short of allowing for the firm, or the multinational firm to enter trade theory. The notion as such, however, has already sparked suggestions of industrial targeting policies to improve competitive performance of domestic industries (as in Dixit 1986, Dixit - Grossman 1986, Grossman - Richardson 1985, Eaton - Grossman 1986, etc). With a few additional, minor modifications associated with the nature of firm learning, such policies become not only empirically but also theoretically wrong.

Swedish manufacturing firms, those that have survived in the long run to become big, have all been through several learning waves or phases of technological developments, that have taken them away from their earlier competitive "roots" in raw material rents (forests, mines) and in process performance based on skilled blue collar labor in Sweden, towards a product quality oriented knowledge base (Ohlsson 1980). This development in part includes the internationalization of firms by adding extensive product knowledge investments in R&D and marketing. This development started a long time ago in some firms that currently belong to the group of Swedish blue chip companies (Ericsson, SKF, ASEA etc.). While economies of scale in process performance are currently in decline in the modern industries

(Carlsson 1988), scale economies have emerged in R&D (Swedenborg 1979) and appear to be the driving force behind the growth of global marketing systems. Similar scale advantages appear to exist also in finance. This generates overall scale economies in the size of the international firm as an administered business system. The situation may even be that the combined scale advantages in product development, marketing, finance etc. are so large that internationalization is globally efficient even though it requires a locally inefficient factory production organization. This may explain the gradual outcontracting of goods production to domestic and foreign subcontractors, that has occurred in all advanced (and especially in high wage) industrial nations.

The more important in output value quality, the more important for commercial success non-tangible competence capital. Hence, the more important our second scale factor, the international firm as a global technological intelligence organization (Eliasson 1987, Chapters I and II. Also see below).

The Size of the International Opportunity Set

With quality being the important element of output, we can abandon the notion that the market imposes a physical limit. There is no physical end to the amount of "quality" that can be consumed, only cost limits. Hence, the limit is shifted backwards towards the supply side and to the competence to supply product quality. With this reformulation the infinite productivity potential of "modern" industrial factory organization, being limited only by the size of markets, as argued by Marx, now takes the shape of a virtually unlimited set of technological and commercial business opportunities. The state space[5] or opportunity set of the economy becomes very large, or for all practical purposes open-ended. Information processing will not be calculation in a Walrasian (1940) or Hayekian (1945) sense, but experimental search into

[5] Please note that state space defines the space within which economic adjustments take place. For the state of full or perfect information of the classical model to be feasible it has to be sufficiently small to be completely transparent at no or negligible information costs and/or that such costs are small and known. I assume state space to be sufficiently large to make the state of perfect information impossible to reach by calculation.

the open-ended state space, hence, my term the experimentally organized economy (Eliasson 1987a). The critical task of a business firm aiming for long-term survival will be to organize the human talent needed to efficiently exploit the large business opportunity set in order to compete successfully with all other agents trying to do the same thing. This reformulation of the theory of the firm, making the firm a competent team of people (Eliasson 1988) is very much in line with the general notion of Coase (1937), but as a factor behind internationalization it is new.

The opportunity set is conceptually close to the notion of a technology system of a firm or a nation. In a limited sense the opportunity set is made up by the best performers of all firms (agents) in the world. Each local technology system is designed to improve (upgrade, innovate) the local system, but also to "take in" and implement locally the content of the global opportunity set (learning, imitation). As Granstrand–Sjölander (1988) has shown, the broader the local technology base the more successful firms. Both the learning and development side of the local technology system includes a considerable management element, to choose (select) and to organize the activities. This learning process has to be made explicit.

3. Economies of Scale in Global Learning

The decision sometime in the past of a number of (now) successful firms to move into the quality end of their product market, or focus on downstream high value production rather than the simple processing of raw materials or the making of standard products may have been a case of "luck", especially in the early start-up phases. But as the transformation of industrial markets began, a larger and larger number of firms, and already large firms, tried to do the same thing. Firms already established in those advanced markets of course had an advantage in sensing the change early. Hence, internationalization involves developing a global intelligence organization as well as a marketing and production system, that broadens the local competence base.

The "technology" to successfully operate industrial activities is a globally available, partly collective good – available in proportion to local (firm) competence – and partly a proprietary competence, locally restricted to the

extent the transmission or wider use of that tacit knowledge can be prevented. In this paper I make the international firm an especially efficient internal communicator of such knowledge. The organization of the international firm gives efficient access both to the world market and to the international pool of industrial knowledge.

Competitive Exposure

The competitive process is made up of a large number of business agents, searching the opportunity set from widely differing, initial competence endowments. Since the opportunity set is extremely large and varied as to content we do not have a typical R&D race for a unique innovation or patent "hidden in a haystack". In our setting (Eliasson 1987a) "anything" can be learned from such daring exploration of the opportunity set, and different explorers can come up with substitute solutions, sufficiently far apart to require a long market trial to be properly evaluated, a market evaluation that in turn brings about new solutions, that have to be tried out in the market, and so on. The market trial of minicomputers, work stations and PC's during the last decade is an interesting illustration. To have a fair chance of succeeding the firms have to learn the technique of organizing themselves as efficient experimentators. In international markets for advanced products and services this means global presence of the organization. Already large manufacturing firms, even entire nations may come out losers with the wrong type of organizational solution, when exposed to the constant and aggressive learning activities of other firms.

While globalization has increased production flow efficiencies through scale, firms have also become increasingly exposed to technological competition from other firms. Hence, the national economy has become potentially unstable. The concentration of specialized production to some large players has increased vulnerability. If one firm – like Volvo in Sweden – experiences problems, the consequences may significantly rock the entire industrial sector of the nation.

All other agents in the market will be engaged in the same competitive game generating a steady stream of unexpected new techniques and products that

compete the economic value of the knowledge of incumbent producers down. We have what I called (1987a) an experimentally organized economy, a market environment in which firms have to be organized as experimentators to cope.

The International Firm as a School

In the competitive market setting introduced above the key strategy of any firm, large and small, will have to be to organize itself as an efficient commercial and technological learner, to be on the offensive, rather than on the defensive, countering successful technological inroads of other firms in their markets.

Once a firm has become a global performer in product and process technology and gained a significant share of the global market, incentives to imitate and/or to enter with innovative new solutions have increased, because of the size of the "prize". Size and global reach, however, also provide insurance against falling behind in competition since in the firm it means – if organized for that – access to the global pool of industrial knowledge in its field (Eliasson 1979, 1987a, 1988c). As the firm is constantly rivaled by the best competitors, its global size ensures the resources to monitor the pool of knowledge and also financial staying power. The firm is constantly at "school". The competitive outcome for the firm, however, all depends on how effectively this learning process is organized.

Different Modes of Learning

The "learning" of firms can be organized very differently. The firm may carry on aggressive inhouse R&D to overwhelm competitors, or it may employ the opposite strategy and make sure to be represented in all sophisticated markets, such that it is immediately alerted through competition to the fact that a competitor is launching a superior product. It then simply learns that something better – in terms of the market – has been achieved. In the latter case the large firm has to be organized for efficient and rapid imitation in order not to lose the opportunity to come first in employing the new

technology successfully on an industrial scale. The first case is typical of the small R&D intensive firm. The latter is typical of the giant multinational, enjoying economies of scale in marketing and production. There is a whole range of different intermediate, organizational solutions to this technology race. One interesting example that I will return to, is the increasing competence of large multinationals to shop for small firms with efficient innovative output. Small firms can organize innovative work much more efficiently than the large bureaucratic firms. However, the existence of an increasing number of small innovative firms requires an active market demand for innovative output. For the innovation firms it does not matter whether U.S., Swedish or Japanese firms buy their technology or the entire firm. The main point is that many buyers exist, so that competition for their products bids up its price and the rate of return on innovative activity (Eliasson 1986b). I will argue below that the large research establishment of the U.S. and its viable entrepreneurial climate has created a competitive advantage for innovation firms, that at the same time may have turned out to be a competitive disadvantage for the traditional U.S. industrial establishment, being less efficient than Japanese and Swedish industries in exploiting the new innovations industrially.

Another approach to innovative learning is diversification and the establishment of "green house" development firms within large firms. This method has not turned out successful (Eliasson–Granstrand 1983). After a decade of experimentation, the crisis years of the 70s have forced large firms across the industrial world to concentrate and focus on what they know best. Outright mergers with firms believed to possess complementary, needed technologies have become common. Automobile manufacturers have felt a strong need in the 80s to acquire aircraft technology. Thus, Mercedes Benz purchased Messerschmidt, BMW Dornier and GM Hughes Aircraft. More understandable is IBM's urgent need to build an internal digital switching and telecommunications competence, first through internal development, then through an external joint venture and finally (unsuccessfully again) through acquiring Rolm[6].

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[6] In 1983 only to sell it to Siemens in 1989. See e.g. Business Week, July 10 1989, p. 45 ff.

Another scheme has been to establish a research and production facility in the midst of the most sophisticated markets, like the LA or San Francisco regions to learn frontier biochemistry and electronics. But the most straightforward – and necessary – method to acquire new know-how for a large firm aiming for long-term survival, simply is to actively enter and participate in the most competitive markets. If competitors with lower costs or superior products show up, you immediately learn that it is possible to be better than you are, and necessary for you to become even better. This is my explanation for the long-run success of the large Swedish manufacturing firms (see Table 2). This also tells why the same firms, increasingly and with varied success have tried to enter the highly competitive U.S. markets in the 80s and similarly for Finnish firms entering the highly competitive Swedish markets.

For the international firm a global intelligence reach is a necessary method to stay competitive. For the domestic firm – as U.S. firms have increasingly learned – technological competition with international firms make them increasingly exposed and handicapped in the catching up game.

This learning theory contradicts the assumptions of the much too stylized U.S. industrial targeting literature and, hence, also its policy conclusions (Spencer–Brander 1983, Brander–Spencer 1984, etc.). The industrial targeting argument is a mathematical repetition of the old "infant industry argument". Firms should be given time to work themselves up their learning curves. This is possible solely on the simple "breaking in" of a narrowly defined process technology, which is completely irrelevant in the context of sophisticated technological competition among manufacturing firms in global markets (Eliasson 1987a). It was not even relevant in the first case of on-the-job-learning, the Horndal effect, reported by Erik Lundberg (1961).

A sustained successful presence in markets for technological product competition requires a global marketing system to minimize R&D costs. However, successful product upgrading also requires a global presence in the markets where the best competitors are. Hence, everything else the same, their presence in sophisticated specialized markets for final goods, employing high wage, skilled labor, and the outcontracting of simple production will increase among sophisticated industrial nations. Entering the highly competitive U.S. market for electronics or information technology – a

strategy of some Swedish firms – thus can be seen as a cost (including the mistakes made) for long-term survival in their field, even though staying local, in less competitive European markets may mean more profits in the short term.[7]

The Unique Advantage of the Giant Firm

A giant firm has a history of success behind it. It has amassed financial resources to weather bad times. It enjoys potential scale advantages, wherever such advantages exist. But it also suffers from scale diseconomies in the form of a growing bureaucratic overhead. In addition it has probably become deeply rooted in a mature industry, where scale in product development, processing and marketing is both the key to continued acceptable profit performance, and a road block of "obsolete" human capital that makes it difficult for the firm to transform itself into something new.

The large computer firms, the automobile industry and the white goods industries are good illustrations. Without European technology within their own technological system Ford and GM would not have been able to turn around their model technology as "fast" as they did. In the adjustment process enormous economic values were burnt off. Giant U.S. white goods manufacturers Whirlpool and General Electric are rapidly trying to shore up their U.S. market positions – against the advances of Electrolux – by teaming up with European competitors (i.a. with Philips). It is no coincidence that aggressive European and Japanese firms in electronics and biochemical industries try to buy new technology in the sophisticated Californian markets by acquiring innovative companies. The list of examples of international firms operating as effective monitoring, intelligence and learning organizations can easily be extended. This extends the notion of the international firm beyond being an exporter of specific capital (Caves 1971) that equalizes rates of return on nation-based specific capital (Helpman 1984), the services of which

[7] Between the presentation and the publishing of this paper Swedish Ericsson has acknowledged failure in the Business Informations system sector, and left it entirely, both in the U.S. and in Sweden, but succeeded in its old telecommunications line, in the U.S. markets.

can be costlessly communicated to its international subsidiaries. Communication is very costly and goes as much the other way. The successful monitoring of international markets for new innovative know-how (imitation) and the internal creation of new business opportunities will make the international firm, if properly organized, a large scale entrepreneurial device, that imports knowledge capital to maintain a higher rate of return, thus suggesting a dynamic interpretation of the Rybczynski (1955) theorem.

4. Effects on and of Market Competition

We are now ready to close the book. The driving force behind technological product quality competition is the scale effect or monopoly rent created by a superior ability to tap the international opportunity set for new technological combinations and to exploit them commercially (call this entrepreneurship). Such innovative competition affects the market situation for incumbent technological monopolies, and exposes them to unpredictable, Schumpeterian competition.

The Evolutionary Process of Growth – An Experimental Acquisitions Game

Globalization of the business organization has become a (learning) technique of improving the technology to improve technology. I have considered two "scale" factors;

(1) The international production and marketing organization makes it possible to achieve economies of scale in production (market demand widening.

(2) Global reach gives superior access to the global pool of technology (access to opportunities).

In both cases the results depend on choosing the appropriate organizational solution to overcome initial barriers to trade and to learn about and to tap the pool of technology.

A statement like this would,however, be inconsistent within the classical trade model. Within its intellectual confines, I cannot say that firms both have to be global to become big and stay global to be able to stay big. An evolutionary market model is needed to understand. A new idea can occur spontaneously, and possibly with a higher probability in a small organizational environment than in a large business hierarchy. The small firm then starts growing on the basis of the rent created by the innovation and its ability to manage growth. Eventually it encounters competition, and the faster the more profitable the innovation and/or the closer it is to substitute products in the market. Economic growth generated by "exogenous" innovations has been described and modeled in literature. At the small, truly innovative end this must be an activity of frequent occurrence, even though empirical studies are mostly of a case study type. Most innovative start–ups fail. Firms that made it large, especially in a short time are few; TetraPak (Sweden), DEC, Apple (the U.S.) and Nixdorf (West Germany)[8] are examples.

The already large firms engaging in volume production are in a different situation. They base their business on size. They are afflicted by internal, organizational inertia that may prevent internal successful innovative activity even though financial capacity exists to carry innovation to full industrial scale (Eliasson – Granstrand 1983). Such large, established firms have to be efficiently organized as technological monitors and imitators to stay competitive. This was one of my two main arguments.

The closer the product of the small innovating firms to one of the well organized large producers, the more precarious its position as an autonomous firm. The big firm may try to "out–R&D" the small innovator, but more likely it will try to acquire it, if it grows too big, to acquire its innovative technology or shut down competition. This is one example of the insurance provided by the global intelligence monitoring of multinationals. The outcome of this internal growth – acquisitions game – which is all very familiar to observers of international industry – depends on a number of circumstances that do not belong to this essay. This little story, however, tells that a dynamic evolutionary perspective is needed to understand both

[8] But it only lasted until 1989. Hurting from the mini-computer squeeze, it was acquired by Siemens.

the existence of the MNF and the sustained successes of so many MNF in highly competitive markets.

The Creation of Unique or Tacit Competence

Joseph Schumpeter (1942) seeing the emergence of giant business firms, organizing large scale science laboratories, was concerned that new organizational technology would make technology development routinized and easily reproducible. Hence, firms that were "lucky" to get started early and competent enough to learn the "routines" would for ever be superior, creating an elite of giant, planned firms, with a unique or tacit competence capital, that no one could challenge, each dominating each market. Excessive concentration driven by scale in the use of knowledge capital would destroy the market economy. This possibility was already expressed by Plummer (1934) for "international combines".

Schumpeter was not worried about efficiency, but about the effects on the national political system and democracy. He did not consider international firms. Plummer, however, noted the negative effects of international monopolies on efficiency, but also the benefits from an international integration of the production system; less national political autonomy and less incentives for war.

Schumpeter's (1942) prediction would only have come true in a world governed by the assumptions of the classical and the new trade models. His argument has been dusted off and rerepresented under the name of industrial targeting in the new international trade literature based on internal firm learning curves, or a sophisticated infant industry protection argument. Plummer's (1934) argument was more modern. Internalization of production across borders through investment and "hierarchies" was more efficient than trade.

Schumpeter's (1942) prediction is effectively reversed if you modify the assumptions of trade theory only slightly by making the opportunity set global and sufficiently large (see above), by allowing for "tacit" organizational knowledge and by modeling the competitive process explicitly. By

varying access, both to the opportunity set and to international markets very different welfare results can be obtained. The more open international markets to each producer, the larger total global output. Here the conclusions of the classical trade model hold up in practice. International markets around industrial nations no doubt warrant the name open. The distributional outcome, however, is not necessarily that of the classical model, dependent as it is on the national endowments of comparative advantages. This formulation implies that access to the opportunity set and to markets is a policy variable. This is wrong. Access to both markets and the opportunity set – as we have demonstrated – first of all rests on the local competence capital of the firm. This competence can only be effectively acquired through active participation in global market competition, and the competence to acquire competence critically depends on the active presence of the firm in global markets. The "learning curve" is part and parcel of its international business system.

The Macroeconomic Consequences

There is still a long way to go to model the macroeconomic consequences of this particular conceptualization of the international firm. A first step could be to bring back Romer's (1986) notion of knowledge as a scale factor in the corporate organization (see above). There are economies of scale associated with knowledge capital, but diminishing returns in the production (R&D organization) of knowledge. For this "production factor" of the firm one can develop on the one hand the idea of the competent team that generates the knowledge capital, and on the other elaborate the macroeconomic consequences of knowledge allocation and accumulation. The first part has already been done verbally in this paper, based on Eliasson (1988c). I will now simply carry Romer's analysis of the macroeconomic consequences a bit further in verbal terms.

Romer (1986, pp 1029 ff) exemplifies with a closed economy subject to an exogenous increase in knowledge capital. Because of increasing returns this will cause the stock of knowledge to be large at all future times, creating permanent aggregate effects, compared to the situation with no exogenous knowledge increase.

In the next example Romer sets up two economies that do not trade. Romer argues that even trade would not remove the divergence of growth between a world without the exogenous increase in knowledge. The same holds for trade in capital goods.

Romer then introduces the possibility of costless mobility of knowledge capital between firms in two different countries. I reinterpret this possibility as the introduction of a multinational firm based on tacit knowledge, the only feature of the international firm (in this interpretation) being that it can transfer knowledge internally at no cost. Romer then demonstrates that for certain forms of R&D technologies, countries will – even from equal initial states – develop unequally for ever. Even more interesting in this context are his conclusions that if all agents are convinced that one rather than the other economy is destined to be a slow growing economy, the knowledge capital will jump immediately to the fast growing economy with higher factor compensation, thus creating an exogenous increase in knowledge capital and a permanent divergence of growth between the two countries. The reader can no see how a link back to the reinterpretation of the Rybczynski theorem introducing investments within the MNC. Transfer of industrial knowledge is never costless. It is quite costly, but it can normally be done less costly within the MNC than through markets. A planned shift of knowledge between Sweden and the EC within multinational corporations based on uncertainty about Sweden's future relation to the EC is exactly what Braunerhjelm (1990) is studying. And the problem is that it might permanently change the relative growth rate of the Swedish and the EC economy the way Romer (1986) predicts. The explanation is, however, different.

5. The Diffuse Notion of a National Industry

The Hecksher–Ohlin theorem demonstrated that the movement of goods through international trade could substitute for the assumed nationally immobile, homogeneous labor in achieving a globally efficient allocation of resources. This was an extension of the principle of comparative advantage based on land rent. Welfare and policy conclusions were straight forward and relating to nations. The economic policy control of the nation state diffuses with the international integration of national markets, favoring nations with

an ample supply of competent firms, playing havoc with badly managed firms and with nations, that cannot breed or keep competent firms within their borders. As long as integration occurs through markets, policy objectives of a rent-seeking society can, however, still be defined, even though integration reduces the power of policy control. With movements of rent-seeking individuals across borders, in response to the success of the national political system to support a national monopoly in markets, the analytical situation gets difficult. The real difficulty arises, however, when transfers of human embodied knowledge occur through the "internal markets" of the firms in response to the policies of nations, endogenizing the structure of the national production system. At the same time global competition and innovative entry check excessive concentration of superior competitors, through decreasing the relative economic value of their business. The outcome is a joint global market allocation of both trade and industrial capital, broadly defined.

Third Complication: The Mobile Industrial Knowledge Base

For a long time trade theory preferred to assume rent creating capital to be land locked. In early departures from that assumption in international finance theory, trade in capital goods and international borrowing was allowed. The multinational firm then clearly looks misplaced (Caves–Jones 1977, Ch. 10; Helpman–Krugman 1985, part IV; Lyons 1984). It was at best superimposed as an intermediator of capital – not (NB) as a global production organization. Through financial arrangements nations could reshape the timing of the capital accumulation process, hence speeding up growth rates and changing (endogenously) the international pattern of comparative advantages. The classical trade model, however, only allowed the comparison of different steady states, with different interest rates and savings ratios set exogenously. Theoretically international monopolies like the MNC could not exist in such equilibrium states.

The uprooting of the national origin of comparative advantages comes with the notion of non-tradable, "tacit knowledge" that has to be "learned" and is embodied with individuals, or internalized within an organization that engages in the creation of new knowledge as well as the coordination of production and of the transmission of knowledge within the organization

(Eliasson 1987a, p. 11 ff). With industrial knowledge embodied in human beings, teams of human beings, or in business organizations it can only be moved within the business organizations or with the individuals. With the transmission of industrial knowledge being largely internalized and the acquisition of critical knowledge necessarily international the transnational business organizations possess a potential competitive advantage in developing and protecting their "unique" knowledge position. We can also understand the international mergers and acquisition activity, intermediated through financial markets as a means of acquiring new industrial knowledge through internalization. Non-tangible, non-tradable knowledge capital has become both the dominant source of business rents (profits) and a critical factor behind the international distribution of comparative advantages.

The distribution of rents from production and trade becomes dependent on the distribution of competence (human) capital and its internal mobility within the administrative systems of firms or within human beings that move between nations.

It is important to understand that the mobile knowledge base is not a matter of how many individuals that move across the national boundaries. For one thing the distribution of business competence over individuals is extremely skewed. Second, and of more quantitative importance, the competence base of a firm is vested in a team or in teams of people (Eliasson 1988c). It can be transferred if the entire team moves to a different firm (innovative acquisitions) or through on-the-job-learning. A firm with unique competence would rarely bestow that kind of teaching on outsiders. However, within the centrally controlled MNC, transfers of knowledge occur in all directions, influencing the internal (and international) specialization of production within the firm and hence the allocation of comparative advantages of nations. With extensive national overlapping of MNC the explanation of trade can no longer be tied to some measurable physical factors with a clear national location. This takes international trade theory back to where it really belongs: to regional trade, over a domain that covers many nations. Competition is between firms, not between economically artificial entities called regions, sectors or for that reason nations.

Classical trade theory did not accept firms or monopolies. The monopolies of the new trade theory are based on nationally bounded economies of scale. This assumption is outright and grossly false for nations like Sweden, the Netherlands, Switzerland, clearly wrong for Germany, the U.K., Japan and the United States and probably very wrong for almost the entire OECD area. It is furthermore becoming increasingly false as the new, knowledge based engineering industries take over dominance, and as the engineering service, consulting and international financing industry become further globalized and integrated with manufacturing.

Fourth Complication – Is There Still a Case for a National Industrial Policy?

With an increasingly mobile industrial knowledge base the mandate for industrial policy has been drastically changed. There are few policy variables available to actively block the international transfer of knowledge within firms. Rather than regulating the border transactions of firms, or subsidizing technology development the policy concern becomes that of making the national economy (governed by policy makers) attractive for the internationally shifting competence base.

To complete the circle we not only have to explain

- the origin of rents, bringing the theories of trade and of the firm together, but also explain

- how the rents are shared

As a consequence, the distributional problem becomes the political issue, since it explains in which political domain the accumulation of competence and of economic growth and the distribution of rents take place. Both the "new trade theory" and the "new theory of industrial targeting" misses that point. There is no feed-back from the sharing of rents to the size and distribution of rents.

The first argument of the new theory of protection or of "industrial targeting" is that the local innovator should be protected from foreign competition until

he has geared up the scale and become competitive in international markets. This modern infant industry argument implies that innovative activity is a purely local process.

The second argument is that the advanced industrial nation needs a domestic full coverage technological base, founded on transferable codable knowledge, and the possibility that such a base can be designed and organized locally. This erroneously assumes such a small opportunity set that somebody (say the National Industrial Technology Board) can survey all technologies of importance and that the nation is large enough to afford to install all the superior technological infrastructure needed. Think of electronics or biochemistry and it is easy to understand that not even the U.S. can be technologically self-sufficient in these two fields.

Both the "infant industry" and the "scientific base" policies are liable to fail in the experimentally organized, global market economy that we have described. At best they can be seen as an inefficient policy solution compared to the ingenious business solution to organize itself for access to the global pool of technology. Nations that do not have the competence at home to build operate and reorganize (Eliasson 1987, 1988a,c, 1989c) large international groups might perhaps opt for the second best solution to subsidize targeted technological development. This is what the new industrial targeting literature proposes. It is, however, clearly wrong for nations like the US and Sweden. In our setting the large US natural science and engineering research community can rather be seen as a giant subsidization arrangement for international firms, notably Japanese firms, that have been more efficient than US firms in monitoring and picking up the new technology created in US markets, and bringing it into large scale industrial production. If the necessary downstream industrial competence is lacking at home, an advanced and broadly based scientific and engineering research community will create a competitive disadvantage for at least some of the domestic industry, if foreign-based international firms are superior in monitoring the research output, in imitating its early industrial applications and in rapidly carrying the innovations into large scale industrial production. Swedish and Japanese firms have clearly been very competent players in this end of the game.

The reason the politicians of nations prefer inefficient technology and targeting policies to relying on the market probably is the natural urge for a politician to be in charge (policy control) of his or her economy. With significant integration of economies not only through markets but also through the internal administrative systems of multinational firms the national economy becomes diffused. It is then only natural that national policy makers lose control. Regaining control is only possible through establishing political hegemony over a larger economy, remaking the MNC into domestic firms. This may be one motive behind the creation of the internal EC 1992 market. If it is the main motive Fortress Europe should be the expected outcome. The vital, competitive market that will restore growth to Europe, presented in the White Book, however, requires open borders and the presence in the internal market of the globally best producers, whether European, U.S. based or Japanese. This would mean more international integration of industrial economies, and less policy control of Europe from Brussels. The ambitions in this respect will be revealed with time by the legislative action in Brussels. The economic argument is, however, crystal clear from the start. This concludes the argument.

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Table 1 **The share in domestic manufacturing employment of the largest manufacturing firms - firm employment in percent of domestic manufacturing employment 1983**

	Sweden	U.S.*	U.K.†	Switzer–land	Japan	West Germany	Canada	France
5 largest	26.1	7.9	10.6	53.7	3.4	10.8	11.8	11.5
10 largest	36.2	11.2	16.8	73.2	5.2	16.5	16.7	17.1
20 largest	46.4	15.3	25.5		7.2	21.6		
40 largest	57.0	21.4						

* 1984. The numbers for the U.S. may appear large. The reasons are that the largest U.S. manufacturing firms – as in Sweden and Switzerland – are very internationalized and that U.S. manufacturing employment in percent of total employment is relatively low.

† Excluding Shell and Unilever.

Source: Jagrén (1986), Fortune, Annual Reports, Common Market Official Statistics.

Table 2 **The largest Swedish (manufacturing) exporters 1965, 1978, 1981 and 1985**

Name of firm Rank by size of exports 1985	Exports (percent of total Swedish goods exported)				Type of activity	Production first started
	1985	1981	1978	1965		
Volvo	11.5	10.6	9.2	5.0	Automobiles, trucks, etc	1926
Saab–Scania	5.4	4.2	3.8	1.6	Trucks, automobiles, aircraft	1937/1891
Asea	4.1	5.2	3.4	2.6	Heavy electrical, robots	1883
Electrolux	3.0	3.6	2.3	0.8	White goods, etc.	1910
Ericsson	3.0	2.5	4.0	2.3	Telecommunications, computers, etc.	1876
Stora Kopparberg	2.5	1.5	1.5	1.7	Copper mining, steel	13th century
SSAB	2.2	1.5	1.5	–	Steel	(1978)
Sandvik	1.9	2.6	2.6	2.2	Tungsten carbide, tools	1862
SCA	1.8	2.3	2.1	3.0	Paper and pulp	1929
Boliden	1.5	1.8	1.2	1.4	Metal and mining	1925
Nobel Industrier	1.5	1.2	1.3	1.0	Weapons, steel, electronics	–
Papyrus	1.4	1.1	0.9	0.3	Paper	1895
SKF	1.3	1.6	1.5	2.5	Ball bearings, etc.	1907
MoDo	1.1	1.3	1.3	2.4	Pulp and paper	1873
Statens Skogsindustrier	1.1	–	–	–	Pulp and paper	1941
Holmens Bruk	1.1	1.2	1.2	1.0	Paper	1609
LKAB	1.1	1.5	1.8	4.6	Iron ore	1890
Alfa Laval	1.0	1.5	1.6	1.1	Dairy systems, centrifugal equipment	1878
Södra Skogsägarna	1.0	1.5	1.5	0.6	Pulp and paper	1943
Swedish Match	0.8	–	–	–	Wood products, matches, chemical products, etc.	1917

Note: In 1984 Electrolux acquired Zanussi, Italy, in 1986 White Inc., USA.

In 1987 ASEA merged with Brown Bovery, Switzerland.

1988 Stora Kopparberg acquired Swedish Match.

Table 3 Dominance in Swedish economy of multinational firms
Percent

The 10 largest Swedish Multinationals accounted for:

	1965	1978	1986
Swedish goods exports	23	27	29
Foreign Swedish employment	80	72	77
Manufacturing employment in Sweden	13	21	25
Including also indirect employment with subcontractors	–	ca 28	–
Total manufacturing R&D expenditures	42	ca 46	71

Source: Swedenborg, B, Johansson-Grahn, Kinnwall, M, Den svenska industrins utlandsinvesteringar 1960–1986, IUI, Stockholm 1988 and De svenska storföretagen (The Giant Swedish Corporations), IUI, Stockholm 1985, p. 216.