FOREIGN DIRECT INVESTMENT AND TRADE

James R. Markusen

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FOREIGN DIRECT INVESTMENT AND TRADE*

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ABSTRACT

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The purpose of this paper is to review recent work which builds on the industrial-organization approach to trade by incorporating the MNE into formal general-equilibrium models. Although empirical work is still limited, results to date are extremely encouraging in that they give strong support to the empirical predictions of the theory. The paper summarises the key ideas from simulation results of the model.

Key words: international trade, foreign direct investment, investment liberalisation

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NON TECHNICAL SUMMARY

Recent efforts by international trade economics have led to the integration of the theory of the multinational enterprise into the theory of international trade. This is both an exciting and an important development. Prior to the last decade or so, analysis of the MNE was largely distinct from trade theory. The former was partial equilibrium in nature, while trade theory maintained the assumptions of constant returns to scale and perfect competition, which generally precluded any discussion of multinational firms by definition. Beginning about 1980, the industrial-organization approach to trade began developing general-equilibrium models with increasing returns to scale and imperfect competition. Yet the multinational firm was generally missing, in spite of having precisely these characteristics.

The purpose of this paper is to review recent work which builds on the industrial-organization approach to trade by incorporating the MNE into formal general-equilibrium models. Although empirical work is still limited, results to date are extremely encouraging in that they give strong support to the empirical predictions of the theory.

A typical point of departure for theory has been the logical premise that firms incur significant costs of doing business abroad relative to domestic firms in those countries. Therefore, for a firm to become a multinational, it must have offsetting advantages. A limited but very useful organizing framework for inquiring into the nature of these advantages was proposed by John Dunning. Dunning proposed that there are three conditions needed for firms to have a strong incentive to undertake direct foreign investments.

Ownership Advantage: the firm must have a product or a production process such that the
firm enjoys some market power advantage in foreign markets.

Location Advantage: the firm must have a reason to want to locate production abroad rather than concentrate it in the home country, especially if there are scale economies at the plant level.

Internalization Advantage: the firm must have a reason to want to exploit its ownership advantage internally, rather than license or sell its product/process to a foreign firm.

An important task of theory is to connect these ideas with the firm and country characteristics in a consistent way. I refer to this as the "knowledge-capital" model, although I note that this is not a widely used term. The paper outlines the assumptions required to make the model operational. The principal conclusions of the analysis can be summarized as follows.

1. Countries will tend to interact by direct investment when (A) they are relatively similar in size and in relative endowments (horizontal investment), or (B) when one country is smaller but skilled-labor abundant (vertical investment).

2. Investment liberalization can reverse the direction of trade when one country is small and skilled-labor abundant. Such a country substitutes the export of services for the export of X.

3. Investment liberalization can decrease the volume of trade in X if trade barriers are relatively high and countries are similar (horizontal investment), but can increase the volume of trade if trade barriers are low and the countries differ in relative endowments (vertical investment).

4. Trade liberalization (in the presence of relatively liberal investment) will tend to reduce investment for relatively similar countries (horizontal investment) but ten to increase investment for relatively dissimilar countries (vertical investments).

5. Investment liberalization has a skilled-labor bias for source countries, but may also have a skilled-labor bias for host countries. The latter occurs when branch plants of foreign multinationals draw factors from less skilled-labor intensive sectors rather than from competing, skilled-labor intensive local firms.

These results have received strong formal support from empirical papers, in particular
direct testing of the model. Hence, these insights are robust and could help policy makers better understand the linkage between cross-border ownership and international trade.
1. Introduction

Recent efforts by international trade economics have led to the integration of the theory of the multinational enterprise into the theory of international trade. This is both an exciting and an important development. Prior to the last decade or so, analysis of the MNE was largely distinct from trade theory. The former was partial equilibrium in nature, while trade theory maintained the assumptions of constant returns to scale and perfect competition, which generally precluded any discussion of multinational firms by definition. Beginning about 1980, the industrial-organization approach to trade began developing general-equilibrium models with increasing returns to scale and imperfect competition. Yet the multinational firm was generally missing, in spite of having precisely these characteristics.

The purpose of this paper is to review recent work which builds on the industrial-organization approach to trade by incorporating the MNE into formal general-equilibrium models. Although empirical work is still limited, results to date are extremely encouraging in that they give strong support to the empirical predictions of the theory.

In the next section, I will briefly review a few stylized facts about the multinationals and the characteristics of countries which are the source and host to direct investment. In section 3, I will present a general conceptual model which attempt to capture or reproduce these stylized facts. Section 4 outlines a formal model and sections 5-8 present some theoretical results, many of which generate testable predictions. These include results on:

(A) what types of firms exist in equilibrium, as a function of technology and country characteristics?

(B) how do multinationals affect the direction of trade?

(C) how do multinationals affect the volume of trade in goods and services?
(D) how do multinationals affect factor prices and income distribution?

(E) how do changes in trade costs affect multinational investment?

Although I will not discuss empirical results in detail in this paper, the theoretical results are receiving good support in formal empirical work.

The paper will conclude by summarizing the findings and with a few thoughts about future data collection efforts.

2. A Few Stylized Facts

Before beginning, a few stylized facts are in order. These are discussed in much more detail in Markusen (1995, 1998). Two terms are used throughout the paper to classify types of direct investment: horizontal multinationals are firms which produce the same goods and services in different locations; vertical multinationals are firms which geographically fragment the production process by stages. For the most part, what follows has been extensively documented and, in my opinion, not controversial.

1. Firm Characteristics: multinationals are firms intensive in the use of knowledge capital. Physical capital intensity and plant-level scale economies do not explain multinationality.

2. Country characteristics: most direct investment occurs among the high-income developed countries. Outward direct investment is associated with a high level of human capital.

3. Most direct investment is horizontal, although it is admittedly hard to separate horizontal and vertical investments in the data.

4. Are trade and DFI substitutes? At a superficial level they look like complements. More recent, formal empirical work suggests that they are indeed substitutes at a fine level of disaggregation, but DFI in a 4-digit industry may be complementary to imports in a different 4-digit industry.

5. There is only weak evidence that trade barriers and/or tax avoidance contribute to explaining direct investment.

Now we consider what sort of a model might explain these stylized facts, linking technology characteristics with country characteristics.
3. **A Knowledge-Capital Approach**

A typical point of departure for theory has been the logical premise that firms incur significant costs of doing business abroad relative to domestic firms in those countries. Therefore, for a firm to become a multinational, it must have offsetting advantages. A limited but very useful organizing framework for inquiring into the nature of these advantages was proposed by John Dunning (1977). Dunning proposed that there are three conditions needed for firms to have a strong incentive to undertake direct foreign investments.

Ownership Advantage: the firm must have a product or a production process such that the firm enjoys some market power advantage in foreign markets.

Location Advantage: the firm must have a reason to want to locate production abroad rather than concentrate it in the home country, especially if there are scale economies at the plant level.

Internalization Advantage: the firm must have a reason to want to exploit its ownership advantage internally, rather than license or sell its product/process to a foreign firm.

An important task of theory is to connect these ideas with the firm and country characteristics in a consistent way. This is something that was undertaken in a number of papers including Markusen (1984) Ethier (1986), Helpman (1984, 1985), Horstmann and Markusen (1987a,b, 1992), Brainard (1993a), Ethier and Markusen (1996), and Markusen and Venables (1998). I will refer to this as the "knowledge-capital" model, although I note that this is not a widely used term.

Consider first ownership advantages. Evidence indicates that multinationals are related to R&D, marketing, scientific ad technical workers, product newness and complexity, and product differentiation. This suggests that multinationals are firms which are intensive in the use of knowledge capital. This is a broad term which includes the human capital of the employees; patents, blueprints, procedures, and other proprietary knowledge, and finally marketing assets such as trademarks, reputations, and brand names.
The crucial question is then why should knowledge capital be associated with multinationals while physical capital is not? I have suggested that the answer lies in two features of knowledge capital. These will appear as assumptions in theoretical models. First, the services of knowledge capital can be easily transported to foreign production facilities, at least relative to the services of physical capital. Engineers and managers can visit multiple production facilities with some ease (although stationing them abroad is costly) and communicate with them in a low-cost fashion via telephone, fax, and electronic mail. This property of knowledge capital is important to firms making either horizontal or vertical investments.

The second property of knowledge capital that leads to the association of multinationals with knowledge capital is the fact that knowledge capital often has a joint-input or "public-good" property within the firm. Blueprints, chemical formula, or even reputation capital may be very costly to produce, but once they are they can be supplied at relatively low cost to foreign production facilities without reducing the value or productivity of those assets in existing facilities. The blueprint, for example, can yield a flow of services in multiple locations simultaneous. This property of knowledge capital, which does not characterize physical capital, is particularly important to horizontal multinationals. But it may be quite important to vertical multinationals as well insofar as the "blueprint" indicates exactly how the geographically fragmented activities, components, and products must fit and work together. In the knowledge-capital framework, multinationals are then exports of the services of knowledge-based assets: managerial and engineering services, financial services, reputations and trademarks.

A third feature of knowledge capital is important in explaining the link between FDI and country characteristics, particularly that skilled-labor-abundant countries are the major source countries for FDI. This is apparently obvious (but nevertheless important to note) assumption that knowledge-capital production is skilled-labor intensive relative to the final production of the MNEs goods and services. Such an assumption is indeed crucial for explaining vertical multinationals which fragment production by stages. Summarizing then, empirical evidence leads us to make three assumptions.

(A) Transportability: the services of knowledge-based assets are easily supplied to
geographically separate facilities.

(B) Jointness: the services of knowledge-based assets are (at least partially) joint ("public") inputs into geographically separate production facilities.

(C) Factor Intensity: Knowledge capital is skilled-labor intensive relative to final production.

The sources of location advantages are somewhat more ambiguous, primarily because they can differ between horizontal and vertical firms. Consider horizontal firms that produce the same goods and services in each of several locations. Given the existence of plant-level scale economies, there are two principal sources of location advantages in a particular market. The first is the existence of trade costs between that market and the MNEs home country, in the form of transport costs, tariffs and quotas, and more intangible "proximity" advantages. Indeed, if trade costs were truly zero, production would be concentrated in a single location (again, assuming plant-level scale economies) with the other location served by exports. That is, some sort of trade costs seem to be a necessary condition for horizontal multinationals to exist. The second source of location advantage, again following from the existence of plant-level scale economies, is a large market in the potential host country. If that market is very small, it will not pay a firm to establish a local production facility but the firm will instead service that market by exports.

The sources of location advantage for vertical multinationals are somewhat different. Suppose for example (as we will do in the next section) that a MNE exports the services of its knowledge capital and perhaps other intermediate inputs to a foreign production facility for final assembly and shipment back to the MNEs home country. This type of investment is likely to be encouraged by low trade costs rather than by high trade costs. Secondly, the most logical situation in which this type of fragmentation arises is when the stages of production have different factor intensities and the countries have different relative factor endowments. Then for example, skilled-labor-intensive R&D and intermediate goods should be produced in the skilled-labor abundant country and less-skilled-labor final assembly should be done in a country with low-wage unskilled labor. Fragmentation arises to exploit factor-price differences across countries.
Internalization advantages are the most abstract of the three. The topic quickly gets into fundamental issues such as what is a firm, and why and how agency problems might be better solved within a firm than through an arm's-length arrangement with a licensee or contractor. Basically, it is my view that internalization advantages arise from the same joint-input, public-goods property of knowledge that create ownership advantages. The property of knowledge that makes it easily transferred to foreign locations makes it easily dissipated. Firms transfer knowledge internally in order to maintain the value of assets and prevent asset dissipation. Licensees can easily absorb the knowledge capital and then defect from the firm or ruin the firm's reputation for short-run profit. Internalization issues are largely peripheral to the themes of this special issue, so I will not deal with them in this paper (again, see Markusen 1995, 1998).

We can summarize this section as follows.

**Ownership advantages:** Arise from knowledge capital, which (a) can be easily transported or transferred to foreign production facilities and (b) has a joint-input property across the different production facilities.

**Location advantages:** For horizontal firms, location advantages arise when the host-country market is large, and (broadly defined) trade costs are moderate to high. For vertical firms, location advantages arise when trade costs are low, stages of production differ in factor intensities, and countries differ significantly in relative factor endowments.

**Internalization advantages:** Internalization advantages arise from the same joint-input characteristic of knowledge capital that creates ownership advantages. Transferring knowledge-based assets through arm's-length market mechanisms runs the risk of asset dissipation.
4. **A Model with Endogenous Multinationals**

In this section, I will outline a model that permits both vertical and horizontal multinationals to arise endogenously in equilibrium. The model and a schematic representation of its results are drawn from Markusen, Venables, Konan, and Zhang (1996b) and Markusen (1997). Principal features of the model are as follows.

1. There are two homogeneous goods, X and Y;
   There are two countries, h and f.
   There are two factors, unskilled labor: L skilled labor: S.

2. Y - competitive, constant returns to scale, L intensive

3. X - imperfectly competitive, increasing returns to scale, S intensive overall.
   "headquarters and "plant" may be geographically separated.
   a firms may have plants in one or both countries.

4. There are six firm types, with free entry and exit into and out of firm types. **Regime** denotes a set of firm types active in equilibrium.

Type $m_h$ - horizontal multinationals which maintain plants in both countries, headquarters is located in country h.

Type $m_f$ - horizontal multinationals which maintain plants in both countries, headquarters is located in country f.

Type $n_h$ - national firms that maintain a single plant and headquarters in country h. Type h firms may or may not export to country f.

Type $n_f$ - national firms that maintain a single plant and headquarters in country f. Type f firms may or may not export to country h.

Type $v_h$ - vertical multinationals that maintain a single plant in country f, headquarters in country h. Type $v_h$ firms may or may not export to country h.

Type $v_f$ - vertical multinationals that maintain a single plant in country h, headquarters in country f. Type $v_f$ firms may or may not export to country f.

Note that if multinationals were suppressed (type-m and type-v firms) then the model would collapse to a standard oligopoly model of international trade. When we do introduce the multinationals,
assumptions about the size, location, and factor composition of fixed costs are crucial to the results. First, with respect to the size of fixed costs, we assume that two-plant multinationals have higher fixed costs than those for a single plant, but not twice as high. This is to say that we assume that there are both firm-level and plant-level scale economies. If there were no firm-level scale economies (two-plant multinationals have twice the fixed costs of a one-plant firm), then there would never exist two-plant type-m firms in equilibrium. If there were no plant-level scale economies (two-plant and one-plant firms have the same total fixed costs), then in general there will never exist one-plant firms in equilibrium.

Second, with respect to the location of fixed costs, we assume that one-plant type-n firms have all their fixed costs in the country where their integrated headquarters and plant are located. One-plant type-v firms are assumed to have the same total fixed costs as type-n firms, but incur these fixed costs in both the headquarters country and in the other country where the plant is located. Two-plant type-m firms have most of their fixed costs in their headquarters country but a significant amount in the other location as well.

Third, results depend very much on the factor composition of fixed costs. We assume that a headquarters uses only skilled labor. An integrated headquarters and plant (a type-n firm) uses a combination of skilled and unskilled labor. A branch plant of a type-m or a type-v firm is less skilled-labor intensive than an integrated headquarters-plant, but still requires significant amounts of skilled labor. We make the assumption that a branch plant is indeed more skilled-labor intensive than Y, the composite "other" sector of the economy. The importance of this last assumption will become clear later. These assumption are summarized as follows.

**Skilled- Labor intensity of activities**

[headquarters only] > [integrated X] > [plant only] > [Y]

We indicated above that type-m firms have higher fixed costs than type-n or type-v firms. We also assume that type-m firms have a higher skilled-labor intensity than the other two. The idea is that type-m firms need additional managers and technicians for branch-plant operation, whereas type-v and type-n firms use only
additional unskilled labor in the shipping costs incurred to serve the other market.

**Skilled-labor intensity of firm types**

[type-m firms] > [type-v and type-n firms]

A few clarifying comments might be useful before showing some of the results produced by this type of model. (1) What is Traded: X, Y, and headquarters’ services, the latter produced with skilled labor. Factors are not directly tradable. Payments for headquarters’ services will show up as the repatriation of markup revenues from foreign plants (since there is free entry, there are no pure profits and markup revenues cover firm-specific and plant-specific fixed costs). (2) What is Technology Transfer: Headquarters’ services, "blueprints". They may be complements or substitutes for host-country skilled labor. This depends on whether branch plants draw skilled labor from the host-country Y sector or an existing X sector. (3) Why is Investment Liberalization different from Trade Liberalization: A skilled-labor scarce country is likely to import X under trade liberalization, but restricted investment. But it may be host to branch plants and export X when investment is liberalized, providing that trade costs are not too high.

5. **Production Regimes and the Volume of Multinational Activity**

Figures 1-3 show results derived from simulations of the model outlined in the previous section when trade costs are high. Each Figure is the world Edgeworth box, with the total world endowment of skilled labor on the vertical axis and the total endowment of unskilled labor on the horizontal axis. Any point in the box thus represents a division of the total world endowment between the two countries, with the countries identical at the center of the box. The endowment of country h is measured from the southwest (SW) corner and that of country f from the northeast (NE) corner. Along the SW-NE diagonal of the box, the countries differ in size (except at the midpoint) but have identical relative endowments. Along the northwest (NW) to southeast (SE) diagonal, the countries have similar total incomes but differ in relative endowments. The diagram thus offers
may different possibilities in which countries may differ in size and/or relative endowments.

Figure 1 gives a stylized summary of the production regime: the types of firms active in equilibrium when trade costs are moderate to high. When countries are relatively similar in both size and in relative endowments near the center of the box, type-m firms dominate. Similar countries interact through direct investment with type-mh and type-mf firms invading each others markets in what we might term intra-industry direct investment. This is an important finding, in that it seems closely consistent with extensive empirical evidence.

When the countries are similar in relative endowments but very different in size, type-n firms headquartered in the larger country dominate. This is especially true if the larger country is also skilled-labor abundant. For example, there are only type-nh firms operating near the NE corner of the Edgeworth box, along the unskilled-labor axis (country h large and skilled-labor abundant). In such an area, the type-nh firms have an advantage over type-nf firms, and all type-m and type-v firms. Type-nf firms are handicapped in that their low-cost (no transport costs) domestic market is small, and they need to bear transport costs to the large country h market. Type-m firms are handicapped in that they must make a fixed-cost investment in a country f plant to serve a very small market. Type-nh firms simply pay the unit transport cost on a small amount of output shipped to the small country f market. Finally, there is no economic motive for type-v firms to enter. Country h is both large and skilled-labor abundant, indicating that both a firm's plant and its headquarters should be located in country h.

Now consider the region in the NW corner of Figure 1 where country h is very skilled-labor abundant relative to country f but not large relative to country f. In this region, only type-νh firms are active. The intuition is that, in the absence of type-νh firms, factor prices would be very unequal in this region. Type-n firms are handicapped in that they must by definition locate their plant and headquarters together. Type-m firms can partially exploit the factor-price difference by locating their headquarters in the country with the low wage for skilled labor, but must locate plants in both countries. Type-νh firms are in the strongest position to
exploit the factor-price differences, locating their headquarters in country h and their single plant in country f.

Summarizing the case for moderate to high trade costs in Figure 1, type-m firms are dominant when countries are similar in both size and in relative endowments. Type-n firms (located in the larger country) are dominate when the countries are very different in size, especially when the larger country is also skilled-labor abundant. Type-v firms (located in the skilled-labor-abundant country) are dominate when the countries are similar in size but very different in relative endowments.

Other areas of Figure 1 consist of complicated and varying mixed regimes, and it is not very important for the purposes of this chapter to examine those areas in detail. One exception is the area below the NW corner where country h is skilled-labor abundant but small. This might be relevant to countries such as Sweden, Switzerland, and the Netherlands. In this region, type-v_h firms are the dominate type of multinationals, but there are also significant numbers of type-n_f firms by virtue of the large size of country f. Headquarters of firms tend to be concentrated in country h, but due to the difference in market size, plants tend to be concentrated in country f. This type of fragmentation, which has been of some concern in the smaller, skilled-labor-abundant countries just mentioned, is nicely captured by the model.

Figure 2 presents stylized results on the trade pattern for the moderate-high trade-cost case. Perhaps the most important conceptual point is that there are two determinants of the direction of trade, with or without multinationals. One is relative factor endowments, with the skilled-labor-abundant country having the advantage in X sector production. The other is country size, due to scale economies at the plant level, with the large country having the advantage in X sector production. When one country is both large and skilled-labor abundant, these two determinants of comparative advantage work in the same direction. Thus we see an area in the NE corner of Figure 2 along the top of the box where country h exports X. When country h is skilled-labor abundant but smaller, the two determinants of comparative advantage pull in opposite directions. The large size of country f in the NW region of the box tends to pull production to country f. But that in turn
has factor-market effects in the absence of multinationals, lowering the skilled-labor wage in country h. Type-
v_h firms enter to exploit this difference, locating their headquarters in country h and their single plant in
country f. Headquarters are concentrated (out of proportion to size) according to factor-price differences in
country h. Since headquarters services are costlessly transported by assumption, country size plays no role in
their location. Plant location, on the other hand, is concentrated more according to country size because of the
transport costs needed to serve the other market. Thus in the NW-SW region of Figure 2, country h imports
X, but exports headquarters services, denoted by S.

Finally, note that in the center region of Figure 2 there is no trade at all in X. With most production
done by type-m firms (some may be done by non-trading type-n firms when the countries differ), interaction
by direct investment completely dominates. While this is clearly counter empirical to any real-world situation,
it is true for example that North Atlantic trade has been largely stagnant for fifteen years, while North Atlantic
direct investment has grown dramatically.

Figure 3 presents the results of an actual computer run of the model for quite high trade costs. The
vertical axis measures the volume of affiliate production in the "world" economy: production by branch plants
of country h firms in country f an vice versus. Along the SW-NE diagonal, where countries differ in size, the
surface has an inverted-U shape. Affiliate production is highest when the countries are identical, and indeed
in the center exactly half of all world production is affiliate production. But the highest level of affiliate
production occurs when one country is relative small (but not too small) and skilled-labor abundant. Then
most or even all firms are headquartered in that country and most or even all plants are located in the large,
skilled-labor-scarce country. It is possible that 100% of all world production can then be classified as affiliate
production.

Figures 4 and 5 presents corresponding results for the case of very low or zero trade costs. The most
important difference between Figure 4 and Figure 1 is that there are no type-m firms active in Figure 4 as trade
costs go to zero. Given plant-level scale economies, no firm will build a second plant when trade is completely
In the center region of Figure 4, only type-n firms are active, reminiscent of many papers in the so-called "new trade theory". Factor prices are equalized in this region, giving no motive for type-v firms to enter. The NW and SE corners of Figure 4 are dominated by type-v firms headquartered in the skilled-labor abundant country much like Figure 1. These firms draw their advantage from exploiting or arbitraging factor-price differences as we noted above.

Figure 5 presents corresponding results on the direction of trade for the low-zero trade-cost case. Intra-industry trade in X occurs when countries are similar in relative endowments, with the skilled-labor abundant country being the net exporter of X. In addition to the absence of type-m firms, the important point to note here is that country size is no longer an advantage when trade costs go to zero. There is no "home market advantage" conferred by country size.

Outside of the region around the SW-NE axis of Figure 5, factor prices become unequal, allowing the entry of type-v firms. Above the diagonal, for example, type-nh firms arise to exploit the relative skilled-labor abundance of country h. As long as the relative endowment differences are not extreme in this region, country h exports both X and headquarters services to country f. The pattern of trade in goods reverses itself when the relative endowment differences become extreme. Headquarters services become concentrated in country h and production of X in country f above the SW-NE diagonal.

I do not produce an equivalent of Figure 3 for the case of low trade. The effect of changing trade costs is temporarily postponed.

What lessons can we draw from Figures 1-5? Unfortunately for empirical work, hypotheses about the importance of multinationals relative to trade in a bi-lateral framework depend on the level of trade costs. For moderate to high trade costs, multinationals are most important between countries that are similar in both size and in relative endowments (often proxied by per-capita income). For low to zero trade costs, multinationals are most important between countries that differ significantly in relative endowments, but are not too different in size. The hypothesis with respect to country size is relatively sharp, but the hypothesis with respect to
relative endowment differences interacts with trade costs.

Empirically, the world looks much more like Figures 1 than like Figure 4. Multinational activity remains concentrated among the high-income countries that are similar in size and in relative endowments. However, the 1990s have seen an increasing amount of investment go to developing countries, and several small, skilled-labor-abundant countries such as Sweden, Switzerland, and the Netherlands have greatly increased their outward investment since the early 1980s. This is consistent with falling trade costs, and a movement toward more type-v investment relative to type-m.

6. Investment Liberalization, the Volume and Direction of Trade

The old question, "what are the effects of multinationals" is often ill posed, since it requires a well-define counterfactual, "as opposed to what", in order to be meaningful. The model outlined above provides a natural counterfactual, obtained by running the model with type-m and type-v firms suppressed. The resulting model is then the well-know free-entry oligopoly model of international trade theory.

Figure 6 and 7 present results on the direction and volume of trade in good X, comparing the results with multinationals permitted to results with multinationals suppressed. These Figures are formed as composite of cases using different levels of trade costs from Markusen, Venables, Konan, and Zhang, and hence they do not correspond exactly to either Figures 1-2 or 3-4.

Figure 6 shows that the liberalization of investment leads to a reversal in the direction of trade when countries differ significantly in relative endowments, but are not extremely different in size. Referring back to Figures 2 and 4, it is clear that in these areas, the skilled-labor-abundant country is importing X with investment unrestricted and therefore exporting X when multinationals are suppressed. Consider the region in the NW corner of Figure 6 for example. The exclusion of multinationals in this region means that production is primarily by type-n_h firms, headquartered and producing in the skilled-labor-abundant country h. Relative endowments are sufficiently unequal that the price of skilled labor is significantly less in country
h and the price of unskilled labor is significantly less in country f. Liberalization of investment leads to a regime shift from primarily type-$n_h$ firms to primarily type-$v_h$ firms. Headquarters are concentrated almost entirely in country h, but enough production is shifted to country f that in the new equilibrium the direction of trade in X is reversed.

The trade-reversal result may be of some importance to policy issues in the high-income developed countries. Occasionally, "competitiveness" gets defined in terms of trade flows, with goods being defined as "high tech" in terms of their overall factor intensities or by their R&D intensities in particular. Figure 6 notes that investment liberalization may lead the skilled-labor-abundant country to import instead of export X, thereby creating a worrying loss of competitiveness. But it is hopefully clear from this model that this is an inappropriate and completely misleading conclusion. The R&D jobs, which are the source of defining X as high tech in the first place, in fact become more concentrated in country h. A more disaggregated view of production indeed establishes that country h is more specialized in high tech production. We shall return to this point in the next section of the paper in discussing factor prices.

There is some general presumption in the theory of the multinational and indeed in all of trade theory that trade and investment are generally substitutes. Substitutes and complements can be defined in several different ways, but one of interest here is with respect to the volume of trade. Trade and investment can be defined as substitutes if investment liberalization reduces the volume of trade or vice versa (the relationship is not reflexive!). Figure 7 presents results on the effect of liberalizing investment on the volume of trade in X. This is a composite diagram for several levels of trade costs as in the case of Figure 7. The result is that investment liberalization decreases the volume of trade (or leaves it constant) over much of parameter space. However, trade and investment are complements when the skilled-labor-abundant country is also the small country, but not extremely so.

Consider for example the hatched area in the Western region of Figure 7. Note in particular that this region overlaps but is not identical to the region of trade reversal in Figure 6. This region of complementarity
in the trade-volume sense is explained by the fact that it is a region of relatively low trade volume in the absence of multinationals. This is in turn explained by the fact that the two sources of comparative advantage in the absence of multinationals pull trade in opposite directions. Country h is small but skilled-labor abundant in the Western hatched region of Figure 7, and we noted earlier that both size and skilled-labor abundance are sources of comparative advantage in X. In the hatched region, country h has a source of comparative advantage in X from its relative factor endowment, but a source of comparative disadvantage in X from its small size. Indeed, there is a locus of points in both hatched regions (not shown) where the volume of trade in X and Y is zero in the absence of multinationals: the size and relative endowment differences exactly cancel one another (Markusen, Venables, Konan, and Zhang).

The hatched regions in Figures 6 and 7 may have some relevance to small, skilled-labor abundant countries such as Sweden. In particular, investment liberalization (generally in the rest of the world and not necessarily, for example, in Sweden) may reverse the direction of trade in some supposedly "high-tech" goods, and may increase the volume of trade. Neither phenomenon is by itself any cause for concern and they represent only a geographic rearrangement of activities by comparative advantage due to the fragmentation permitted by liberalization.

7. Investment Liberalization and Factor Prices

Another important question, both from the point of view of positive theory and the point of view of policy analysis, is the effect of investment liberalization on factor prices. Factor prices, of course, in turn determine the distribution of income.

Figure 8 presents some simulation results, focusing on the real wage of skilled labor in country h (h is again measured from the SW corner of the world Edgeworth box). The hatched areas are areas in which the real wage of skilled labor rises in both countries following investment liberalization from an initial situation in which multinationals are initially banned. When country h is skilled-labor abundant (above the SW-NE
diagonal), liberalization results in the concentration of corporate headquarters in country h, the entry of type-v_h and/or type-m_h firms. This raises the real wage of skilled labor in equilibrium. But the interesting thing to note is that the skilled-labor also benefits if country h is relatively small and skilled-labor scarce (along part of the horizontal axis). In this area, country h produces little or no X with MNEs banned by assumption. Investment liberalization results in country h getting branch plants of type-v_f firms, with resources drawn from country h's Y sector, not from local X producers. Since plants are more skilled-labor intensive than the composite Y sector by assumption, this results in an equilibrium increase in the real wage of skilled labor in country h.

Figure 8 shows the combined results for both countries, with the hatched areas being regions in which the skilled-labor wage rises in both countries. This tends to occur when one country is large and skilled-labor abundant and the other is small and skilled-labor scarce. What is happening here is that investment liberalization results in the transfer of plants from country h to country f as just noted above. These plants are skilled-labor intensive from the small country's point of view (resources are drawn from the Y sector) but not from the large country's point of view (which becomes more specialized in headquarters' services). Thus resources are being shifted toward skilled-labor-intensive activities in both countries, something that cannot occur in the Heckscher-Ohlin model for example.

Figure 8 is interesting in light of evidence that the gap between skilled and unskilled wages has been rising in both the developed and many developing countries. To date, multinationals and world investment liberalization has not been viewed as playing a possible role. Almost all of the debate has centered on whether it is due to technological change or to trade liberalization.

8. Changes in Trade Costs

We can conclude the analysis by looking at the effect of changing trade costs, given that investment is liberalized before and after the change in trade costs. Figure 9 shows the effects of lowering trade costs on the volume of affiliate production. The results are actually quite intuitive. When the countries are similar
in size and in relative endowments, multinationals are horizontal type-m firms with plants in both countries. Trade liberalization removes the incentives for a foreign branch plant, and so type-n firms replace type-m firms. The volume of affiliate production falls.

When one country is small and skilled-labor abundant, multinationals are type-v firms with their headquarters in the skilled-labor-abundant country and their plants in the other country. This type of vertical activity is encouraged by low trade costs, and so trade liberalization increases affiliate production.

In a sense, trade and investment are complements when the countries differ in relative endowments and investment is vertical, while trade and investment are substitutes when the countries are similar and investment is horizontal. Some caution is needed, however, as we see in comparing Figure 7 with Figure 9. We are going to get somewhat difference results when we look at the liberalization of investment holding trade costs constant (Figure 7) than when we look at the liberalization of trade costs holding investment barriers at zero (Figure 9).

9. **Conclusions, Directions for Further Data Collection**

Principal conclusions of the analysis can be summarized as follows.

1. Countries will tend to interact by direct investment when (A) they are relatively similar in size and in relative endowments (horizontal investment), or (B) when one country is smaller but skilled-labor abundant (vertical investment).

2. Investment liberalization can reverse the direction of trade when one country is small and skilled-labor abundant. Such a country substitutes the export of services for the export of X.

3. Investment liberalization can decrease the volume of trade in X if trade barriers are relatively high and countries are similar (horizontal investment), but can increase the volume of trade if trade barriers are low and the countries differ in relative endowments (vertical investment).

4. Trade liberalization (in the presence of relatively liberal investment) will tend to reduce investment for relatively similar countries (horizontal investment) but ten to increase investment for relatively dissimilar countries (vertical investments).

5. Investment liberalization has a skilled-labor bias for source countries, but may also have a skilled-labor bias for host countries. The latter occurs when branch plants of foreign multinationals draw factors from less skilled-labor intensive sectors rather than from competing, skilled-labor intensive local firms.
What is the way forward? In the area of theory, much needs to be done endogenizing firm organization. We need a better understanding of when firms chose a wholly owned subsidiary over a licensing agreement or a joint venture. Many footwear and clothing firms, for example, do not own foreign plants, they simply contract with foreign producers once the firm produces its designs. This is a positive question with closely related normative questions: what are the welfare consequences for host countries of different forms of organization. Should countries pressure multinationals toward joint ventures with local partners? What are the consequences of contract enforcement, intellectual property protection and so forth on choice of mode and what are their welfare consequences? Once we have a better understanding of these issues, it will be easier to approach the big issues such as whether or not developing countries should commit to a code on investment and whether or not an international competition policy should be adopted.

In the area of empirical analysis, an advantage of the approach outlined in this paper is that it has clear testable hypotheses. Some of the empirical work to date, particularly the Brainard (1993b, 1996) and Ekholm (1995, 1997, 1998) papers along with Carr, Markusen, and Maskus (2000) give good support to the theory. But much remains to be done, including firm-level studies and analyses that can clearly differentiate between horizontal and vertical investments. Policy analysis could benefit greatly from empirical analyses of what sort of policies are most encouraging (e.g., infrastructure) and discouraging (e.g., taxes, political instability, weak legal institutions) to inward investment.

Finally, I will conclude with a few brief comments about data collection. From my perspective as a microeconomic international trade economist, data collection on multinationals is dominated by financial data, such as stock and flows of investment. What we would like to have, in order to examine the ideas in this paper more fully, are more "real" data on production and intra-firm trade in goods, and especially intra-firm trade in the services of intangible assets.

1. What do foreign affiliates of domestic firms produce abroad?
2. What is the pattern of intra-firm trade in goods (e.g., final and intermediate)?
3. What is the pattern of intra-firm trade in services, particularly the exports of managerial, technical,
engineering, financial, and marketing services from the home firm to the affiliate.

4. What is factor intensity of domestic versus foreign operations (e.g., employment of skilled versus less skilled works, engineers and technicians etc. in home versus affiliate operations)?

This type of information would give us a much better understanding of multinationals, and a much better ability to predict the effects of trade and investment liberalization on the location of production and employment, and on trade flows and factor prices.
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Figure 1: Equilibrium Regime with High Trade Costs

Type $m$ firms dominate

Figure 2: Trade Regime with High Trade Costs

Country $h$ exports $X$
Country $h$ imports $X$
No trade in $X$
Figure 3: Volume of Affiliate Production: 25% trade costs
Figure 4: Equilibrium Regime with Low Trade Costs

Figure 5: Trade Regime with Low Trade Costs
Figure 6: Investment Liberalization and the Direction of Trade

- Investment liberalization reverses the direction of trade.
- Investment liberalization holds constant the direction of trade or eliminates trade.

Figure 7: Investment Liberalization and the Volume of Trade

- Investment liberalization increases the volume of trade.
- Investment liberalization reduces the volume of trade.
Figure 8: Investment Liberalization and the Return to Skilled Labor

- Skilled wage rises in both countries
- Skilled wage rises in skilled-labor abundant country
- Skilled wage falls in both countries
- Skilled wage rises in skilled-labor abundant country
- Skilled wage rises in both countries
Figure 9: Effect of Trade Liberalization on the Volume of Affiliate Production
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Foreign direct investment theories. Certain theorists have attempted to address limitations of international trade theories. Selected theories of international trade and foreign direct investment. Theory type Theoretical emphasis Credited writers. International trade theories. Classical trade theory Countries gain if each devotes resources to the production of goods and services Ricardo (1817), in which it has an advantage Smith (1776). Factor proportion theory Countries will tend to specialize in the production of goods and services that Hecksher and Ohlin (1933), utilize their most abundant resources. Product life cycle theory The cycle follows that: a country’s export strength builds; foreign production Vernon (1