

Direct investment refers to firms or individuals owning controlling interests in foreign firms.

Multinational Corporations

1. Review of empirical evidence
2. Dunning's OLI, joint inputs, firm versus plant-level scale economies
3. A model with endogenous multinationals
4. Pattern of trade in goods and services
5. Motives for internalization
6. A model of internalization

- (1) Multinationals are associated with high ratios of R&D relative to sales.
- (2) Multinationals employ large numbers of scientific, technical, and other "white collar" workers as a percentages of their work forces.
- (3) Multinationals tend to have a high value of "intangible assets"; roughly, market value minus the value of tangible assets such as plant and equipment.
- (4) Multinationals are associated with new and/or technically complex products.
- (5) Evidence suggests that multinationality is negatively associated with plant-level scale economies.
- (6) Multinationals are associated with product-differentiation variables, such as advertising to sales ratios.

- (7) A minimum or "threshold" level of firm size seems to be important for a firm to be a multinational, but above that level firm size is of minimal importance.
- (8) Multinationals tend to be older, more established firms.

- (1) The high-income developed countries are not only the major source of direct investment, they are also the major recipients. Most direct investment seems to be horizontal.
- (2) There has been a major boom of direct investment into the developing countries in the 1990s, but most of it has gone to the more advanced LCDs and to China. Little goes to the least developed countries.
- (3) Direct investment stocks have grown significantly faster than trade flows over the last two decades, even though trade barriers have fallen dramatically.
- (4) High volumes of direct investment are associated with similarities among countries in terms of relative factor endowments and per capita incomes, not differences.

- (5) A high volume of outward direct investment is positively related to a country's endowment of skilled labor and insignificantly or negatively related to its physical capital endowment.
- (6) There is little evidence that direct investment is primarily motivated by tariff avoidance or measurable transport costs,
- (7) There is mixed evidence that tax avoidance and/or risk diversification are important motives for direct investment. Some evidence does suggest that political risk discourages inward investment.
- (8) Infrastructure, skill levels, and a minimum threshold level of per capita income seem to be very important determinants of direct investment.
- (9) There is evidence that agglomeration effects are important in direct investment. But it is admittedly difficult to distinguish agglomeration effects from firms being drawn to the same (unobserved) site-specific resources.

Table 1

Annual growth rate (%), all countries

	1986-1990	1991-1994	1996-2000
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FDI inflows	22.9	21.5	39.7
FDI stocks	14.7	9.3	16.9
Sales of foreign affiliates	16.0	10.2	9.7
Royalties and fees receipts	21.3	14.3	7.7
GDP at factor cost	10.1	5.1	1.3
Exports of goods and non-factor services	14.3	8.7	3.6

Table 2

FDI inflows and outflow, share in total

Year	Developed		Developing		Share of all developing in to China
	in	out	in	out	
1983-1987	76	95	24	5	
1988-1992	78	93	21	7	
1992-1997	58	84	38	16	28
2000	80	91	18	8	16
2003	66	93	31	6	31
2007	68	85	27	13	31

Correlation between Foreign Ownership Shares and Characteristics of Industries (Andrew Dick, JIE 1993) (1982 and 1987 data)

<u>Variable</u>	<u>Pearson Correlation Coefficient</u>
Net Income divided by Assets (proxy for intangible assets)	0.357
Advertising Intensity	0.283
% of Total Employees in R&D	0.228
Median Plant Shipments/ Industry Average Shipments (economies of scale?)	0.610

Capital to Value Added Ratio	0.175
Patent Effectiveness	
process R&D	0.814
product R&D	0.574
Research Lead Time	
process R&D	0.785
product R&D	0.615

Point of Departure for Theory:

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.

Dunning (OLI): There are three necessary conditions for firms to be willing to undertake investments abroad

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.

Ownership Advantages, Firm-Specific Assets, and Knowledge Capital

Multinationality related to R&D, marketing, scientific and technical workers, product newness and complexity, product differentiation.

MNEs intensive in knowledge capital, knowledge-based assets

- (1) services of knowledge capital easily transported to distant plants
- (2) joint input or "public goods" nature of knowledge capital.

Physical capital intensity by itself should not give rise to multinationality.

What is being traded?

Multinationals are exports of the services of knowledge-based assets: managerial and engineering services, financial services, reputations and trademarks.

Location advantages.

Horizontal multinationals producing the same goods and services in each location: Large markets and high trade costs.

Vertical multinationals geographically fragmenting the production process by stages: factor-price differences across countries are linked to the factor intensities of different stages, low trade costs.

Internalization advantages.

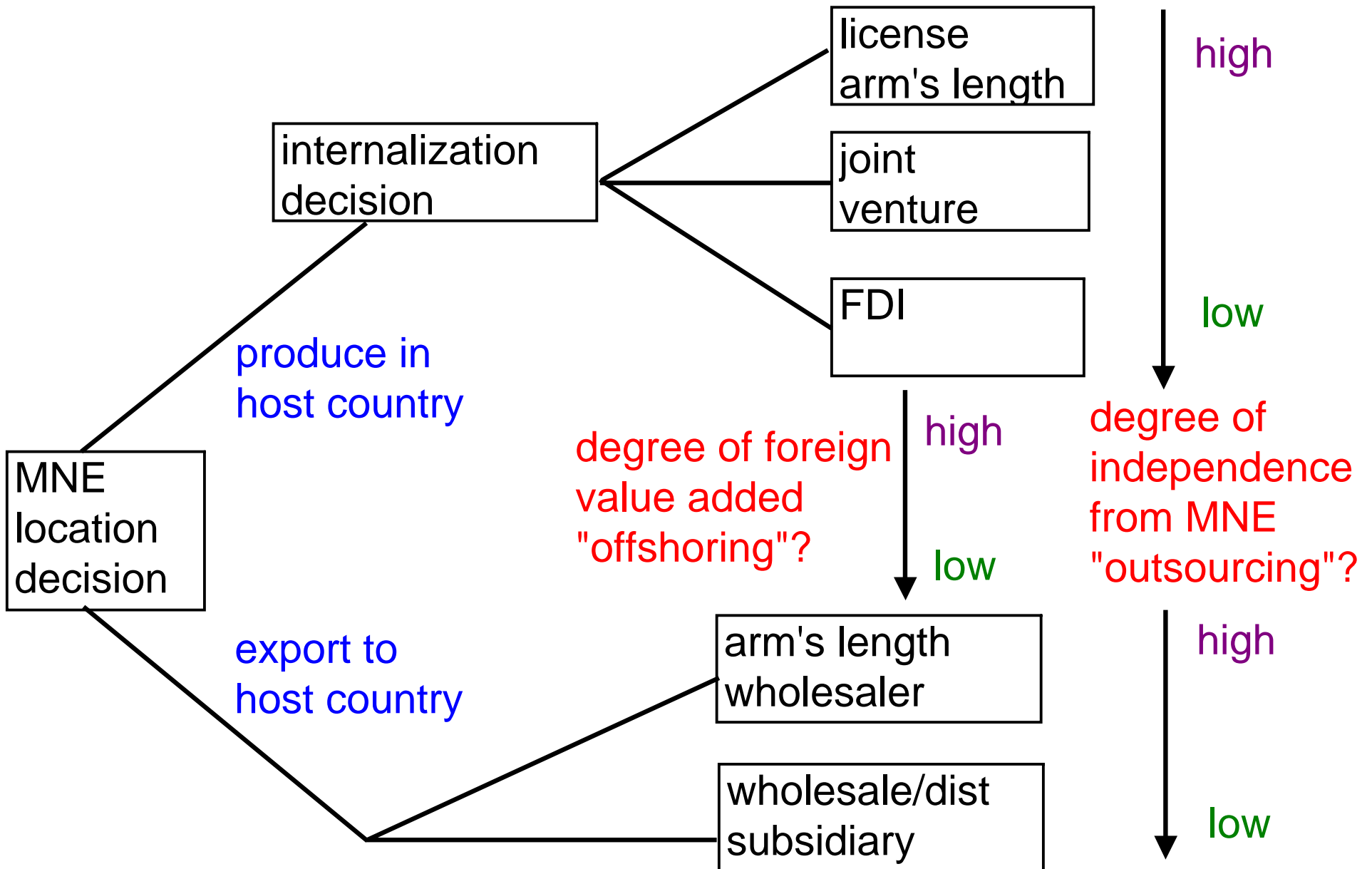
The same joint-input, public-goods property of knowledge that makes it easily transferred to foreign locations makes it easily dissipated.

For example, after some period of learning, a local licensee absorbs and essentially “owns” the knowledge.

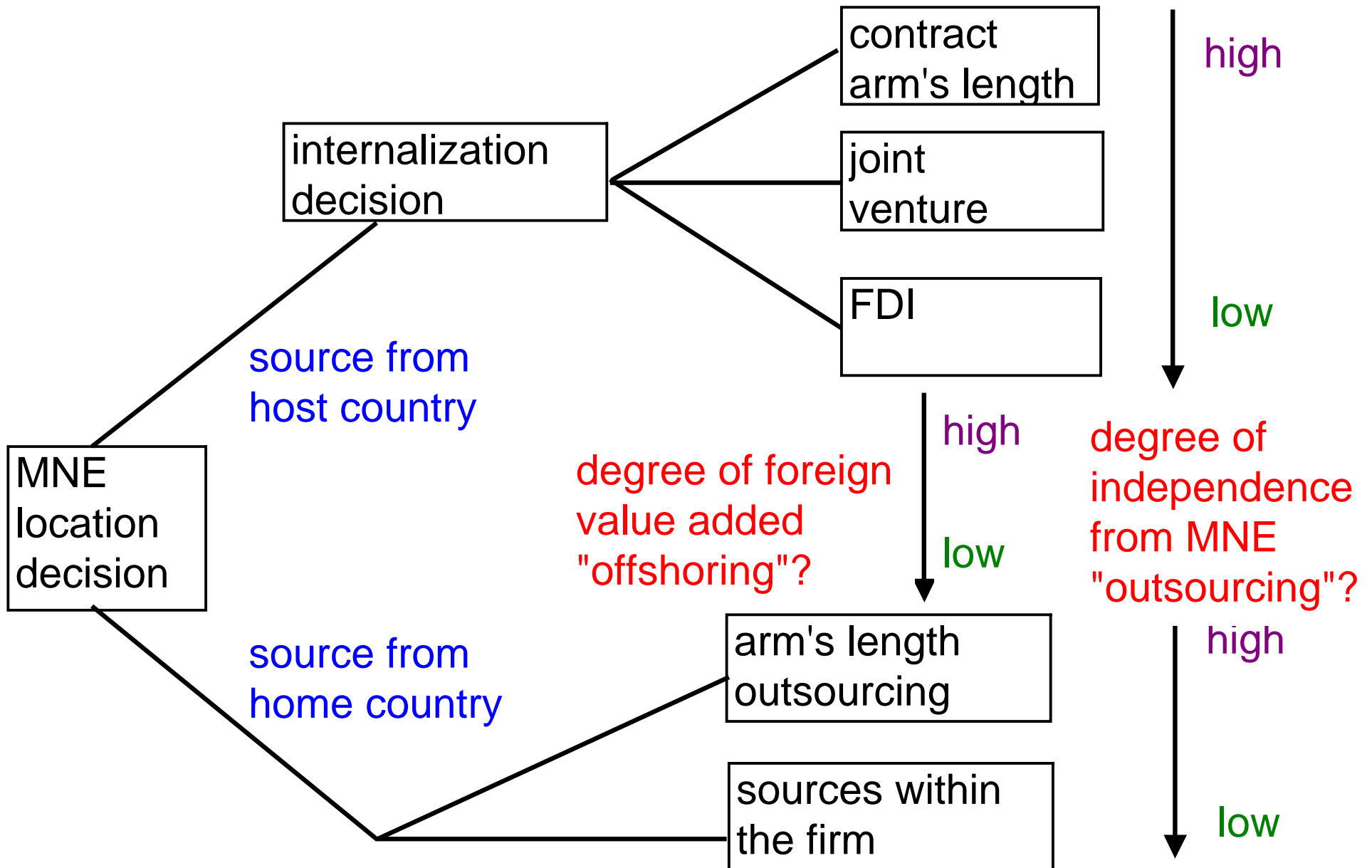
Licensee can engage in a credible “hold-up” threat to earn more or else become an independent competitor.

Firms transfer knowledge internally in order to maintain the value of assets and prevent dissipation.

Motive: serve host-country market (aka, horizontal, market-seeking)



Motive: host as low-cost supplier (aka, vertical, resource-seeking)



Elements of a simple model of “horizontal” or ‘multi-plant’ multinationals.

Firm's technology.

F - firm-specific fixed costs

G - plant-specific fixed costs

c - constant marginal cost per unit

t - shipping or tariff or other cost unit

Multi-plant economies of scale.

F is a joint-input across plants.

Fixed costs of a two-plant firm is less than the fixed costs of a one-plant national firm.

$$(F + 2G) < (F + G) + (F + G) = 2F + 2G.$$

But, this does not immediately imply that all firms will be multinationals. That will depend on the size of G , the fixed costs of a second plant, versus t , the unit trade cost.

“Vertical” multinationals are firms that geographically fragment production by stages, such as R&D and components in one country and final assembly in another country.

A vertical dimension is added to the model outlined above by allowing F , G , and c to have different factor intensities; e.g., skilled-labor intensity is higher for F than for G which is in turn higher than for c .

Or it may simply be that the foreign market is much larger, and it is better to have a single plant there to minimize shipping costs.

Multi-plant (horizontal) multinationals have an advantage over single-plant national firms when:

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(1) The overall market is large.

Becoming a multinational is a high fixed-cost option, while exporting is a high variable cost option.

(2) The markets are of similar size.

If one market is very small, a firm will not want to locate costly capacity there, it will serve the small country from a plant in the large country.

(3) Labor costs are similar.

If factor prices are very different in the two countries, the multinational may want to locate all activities in the favored country.

(4) Firm-level scale economies are large relative to plant-level scale economies. (The added fixed costs of becoming a multinational firm are low.)

Obvious

(5) Transport costs are high.

With plant-level scale economies, a firm would concentrate all activities in one country if trade costs were zero.

Vertical multinationals tend to arise when factor prices across countries are very different as are the factor intensities of different stages of production.

R&D and component production is often done in skilled-labor-abundant countries, and final assembly in unskilled-labor-abundant countries.

A model of a single monopoly multinational serving two markets, and faces the choice between

a single plant at home (exporting to the other market), plants in both countries (a horizontal multinational) or a single plant in the foreign country exporting back home.

The inverse demand curve for the product in country i is:

$$p_i = \alpha - (\beta/L_i)X_{ii} \quad (6)$$

Let Π_{ii} denote profits for a domestic firm on domestic sales minus fixed costs.

c_i is the marginal cost of production,

G is a plant-specific fixed cost

F is a firm-specific fixed cost.

$$\Pi_{ii} = p_i X_{ii} - c_i X_{ii} - G - F = [\alpha - (\beta/L_i)X_{ii}]X_{ii} - c_i X_{ii} - G - F \quad (7)$$

The first-order condition with respect to X_{ii} is:

$$\frac{d\Pi_i}{dX_{ii}} = \alpha - 2(\beta/L_i)X_{ii} - c_i = 0 \quad (8)$$

This gives equilibrium supply of X to the local market.

$$X_{ii} = \frac{\alpha - c_i}{2\beta} L_i \quad (9)$$

$$\Pi_{ii} = (p_i - c_i)X_{ii} = \left[\alpha - (\beta/L_i) \frac{\alpha - c_i}{2\beta} L_i - c_i \right] \frac{\alpha - c_i}{2\beta} L_i \quad (10)$$

$$\Pi_{ii} = (p_i - c_i)X_{ii} = \left[\frac{\alpha - c_i}{2\beta} \right] \frac{\alpha - c_i}{2\beta} L_i = \left[\frac{\alpha - c_i}{2\beta} \right]^2 L_i \quad (11)$$

If the firm exports to country j, its profit equation for export sales Π_{ij} (arbitrarily imputing fixed costs to the domestic profit equation (7)) is as follows.

$$\Pi_{ij} = p_j X_{ij} - (c_i + t)X_{ij} = [\alpha - (\beta/L_j)X_{ij}]X_{ij} - (c_i + t)X_{ij} \quad (13)$$

Maximization of (13) yields the equilibrium export supply.

$$X_{ij} = \frac{\alpha - c_i - t}{2\beta} L_j \quad \Pi_{ij} = \left[\frac{\alpha - c_i - t}{2\beta} \right]^2 L_i \quad (14)$$

We can now summarize the total profits the firm would obtain from each of its three alternative modes of serving market j . Superscripts refer to types d , h , and v .

$$\Pi_i^d = \Pi_{ii} + \Pi_{ij} = \beta \left[\frac{\alpha - c_i}{2\beta} \right]^2 L_i + \beta \left[\frac{\alpha - c_i - t}{2\beta} \right]^2 L_j - G - F \quad (16)$$

$$\Pi_i^h = \Pi_{ii} + \Pi_{jj} = \beta \left[\frac{\alpha - c_i}{2\beta} \right]^2 L_i + \beta \left[\frac{\alpha - c_j}{2\beta} \right]^2 L_j - 2G - F \quad (17)$$

$$\Pi_i^v = \Pi_{ji} + \Pi_{jj} = \beta \left[\frac{\alpha - c_j - t}{2\beta} \right]^2 L_i + \beta \left[\frac{\alpha - c_j}{2\beta} \right]^2 L_j - G - F \quad (18)$$

These equations show us the results discussed above

market size

similarity or differences in market size

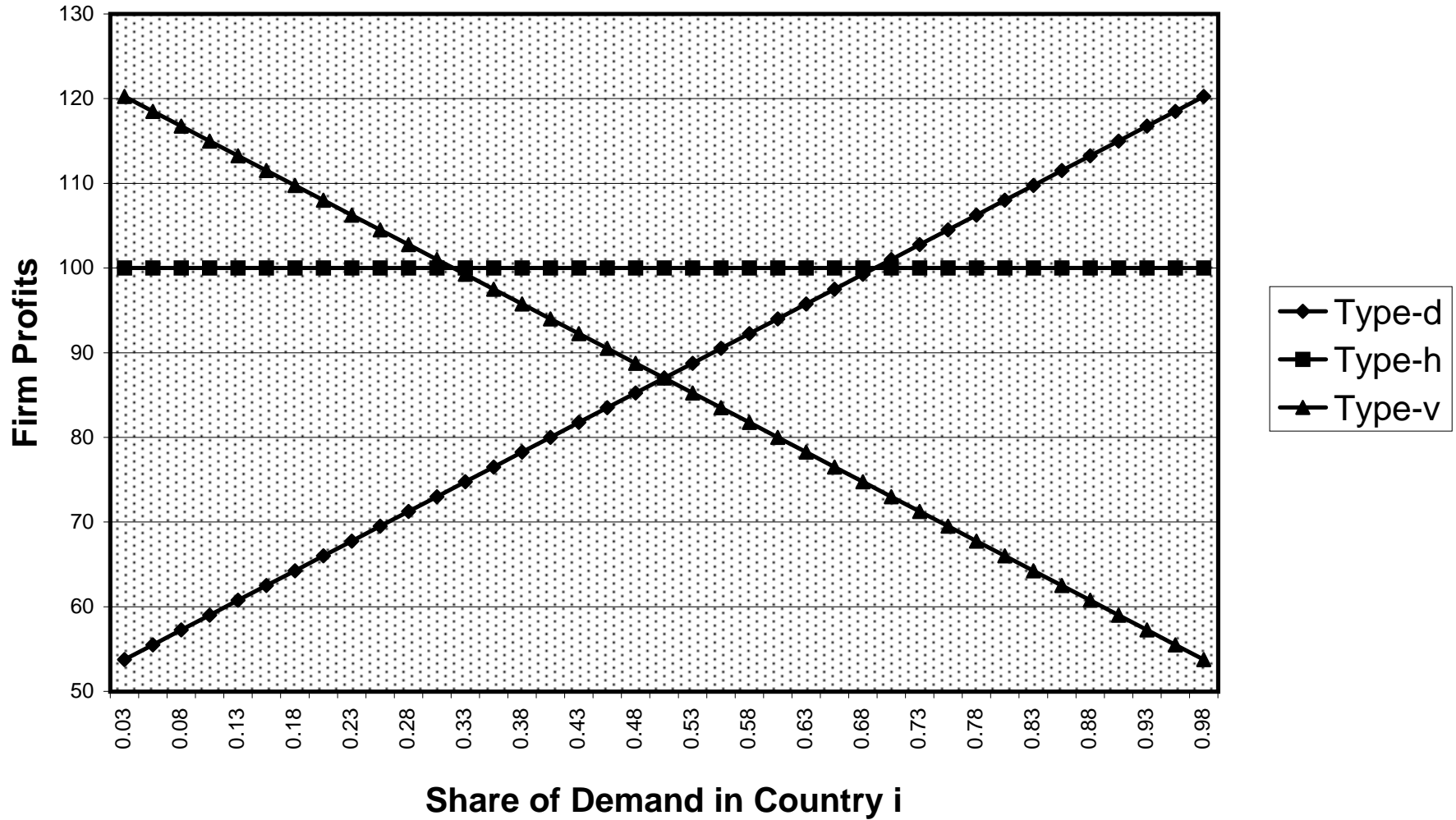
trade costs

marginal production cost difference between markets

firm versus plant level scale economies

Figure 1

Figure 1: Relative Size Differences and Choice of Regime, the Base Case



General Idea: some of the same properties of knowledge capital that create ownership advantages create internalization advantages.

These arise from the jointness property of knowledge along with moral hazard, asymmetric information, and the infeasibility of complete and/or enforceable contracts.

Consider a firm choosing between opening a subsidiary in a foreign country (a costly option) and simply selling or licensing its technology to a foreign firm.

Some internalization models involving the stylized facts on knowledge capital, product newness and complexity.

(1) A firm is reluctant to reveal its product or process to a licensee, who may reject the proposal, but now has the knowledge. But the potential licensee is not going to sign an agreement without knowing what it is buying.

(2) The licensee knows that the firm may not have an incentive to truthfully reveal the product's quality.

(3) The newness of the product may create an informational asymmetry in the opposite direction: the potential licensee may have a much better idea of how the product will sell in its local market, while the MNE does not. The licensee extracts rent to reveal the information.

(4) Bi-lateral uncertainty over start-up problems, worker productivity and learning rates.

(5) Knowledge is easily learned by new employees. The licensee may be able to defect, starting a new firm in competition with the MNE.

(6) Product quality is an intangible asset. A licensee may have an incentive to reduce quality, capturing a short-run gain at the expense of losing the contract.

(7) Difficulties in choosing between costly monitoring and suffering the costs of moral hazard when employing licensees.

(8) Differences in objectives and goals between the firm and the licensee.

Elements of a Model (Markusen, JIE 2001)

(1) The MNE introduces (or attempts to introduce) a new product every second time periods. Two periods are referred to as a "product cycle".

A product is economically obsolete at the end of the second period (end of the product cycle).

(2) The probability of the MNE successfully developing a new product in the next cycle is $1/(1+r)$ if there is a product in the current cycle, zero otherwise

(i.e., once the firm fails to develop a new product, it is out of the game).

The probability of having a product in the third cycle is $1/(1+r)^2$ etc.
Ignore discounting.

(3) The MNE can serve a foreign market by exporting, or by creating a subsidiary to produce in the foreign market.

(4) Because of the costs of exporting, producing in the foreign country generates the most potential rents.

(5) But any local manager learns the technology in the first period of a cycle and can quit (defect) to start a rival firm in the second period.

Similarly, the MNE can defect, dismissing the manager and hiring a new one in the second period. The (defecting) manager can only imitate, not innovate and compete in the next product cycle.

(6) Initially, no binding contracts can be written to prevent either partner from undertaking such a defection.

(7) Initially, I will assume that the MNE either offers a self-enforcing contract or exports. The possibility that defection occurs as an equilibrium is allowed later in the paper.

(8) Notation is as follows.

- R- Total per period licensing rents from the foreign country.
- E- Total per period exporting rents ($E < R$).
- F- Fixed cost of transferring the technology to a foreign partner. These include physical capital costs, training of the local manager, etc.
- T- Training costs of a new manager that the MNE incurs if it dismisses the first one (i.e., if the MNE defects).
- G- Fixed cost that the manager must incur if he/she defects. This could include costs of physical capital, etc.
- L_i - Licensing or royalty fee charged to the subsidiary in period i ($i = 1, 2$).

Rents earned by the manager in one product cycle: $V = (R-L_1) + (R-L_2)$.

V/r - Present value of rents to the manager of maintaining the relationship.

The manager ("a" for agent) has an "individual rationality" constraint (IR): the manager must earn non-negative rents. The manager also has an incentive-compatibility constraint: the manager must not want to defect in the second period.

$$(1) \quad (R - L_1) + (R - L_2) \geq 0 \quad \text{IR}_a$$

$$(2) \quad (R - L_2) + V/r \geq (R - G) \quad \text{IC}_a$$

$$\text{where } V = (R - L_1) + (R - L_2)$$

$(R - G)$ is the payoff to unilaterally defecting.

The MNE similarly has an "individual rationality" constraint (IR): the MNE must earn non-negative rents. The MNE also has an "incentive-compatibility constraint: the MNE must not want to defect (fire the manager) in the second period.

$$(3) \quad L_1 + L_2 - F \geq 2E \quad \text{IR}_m$$

$$(4) \quad L_2 \geq R - T \quad \text{IC}_m$$

Combine the IC constraints.

$$(5) \quad R - T \leq L_2 \leq G + V/r$$

Firm's objective is to minimize V subject to this incentive compatibility. Solving this problem yields:

$$(6) \quad 2R - L_1 - L_2 = V = r(R - T - G) > 0 \quad (\text{rent share to the manager})$$

Result 1:

If $R \leq G + T$, the MNE captures all rents in a product cycle, henceforth referred to as a rent-capture (RC) contract. This situation occurs when

- (1) The market is relatively small.
- (2) Defection costs for the MNE (T) are high.
- (3) Defection costs for the manager (G) are high.

If $R > T + G$, there is no single-product fee schedule that will not cause one party to defect.

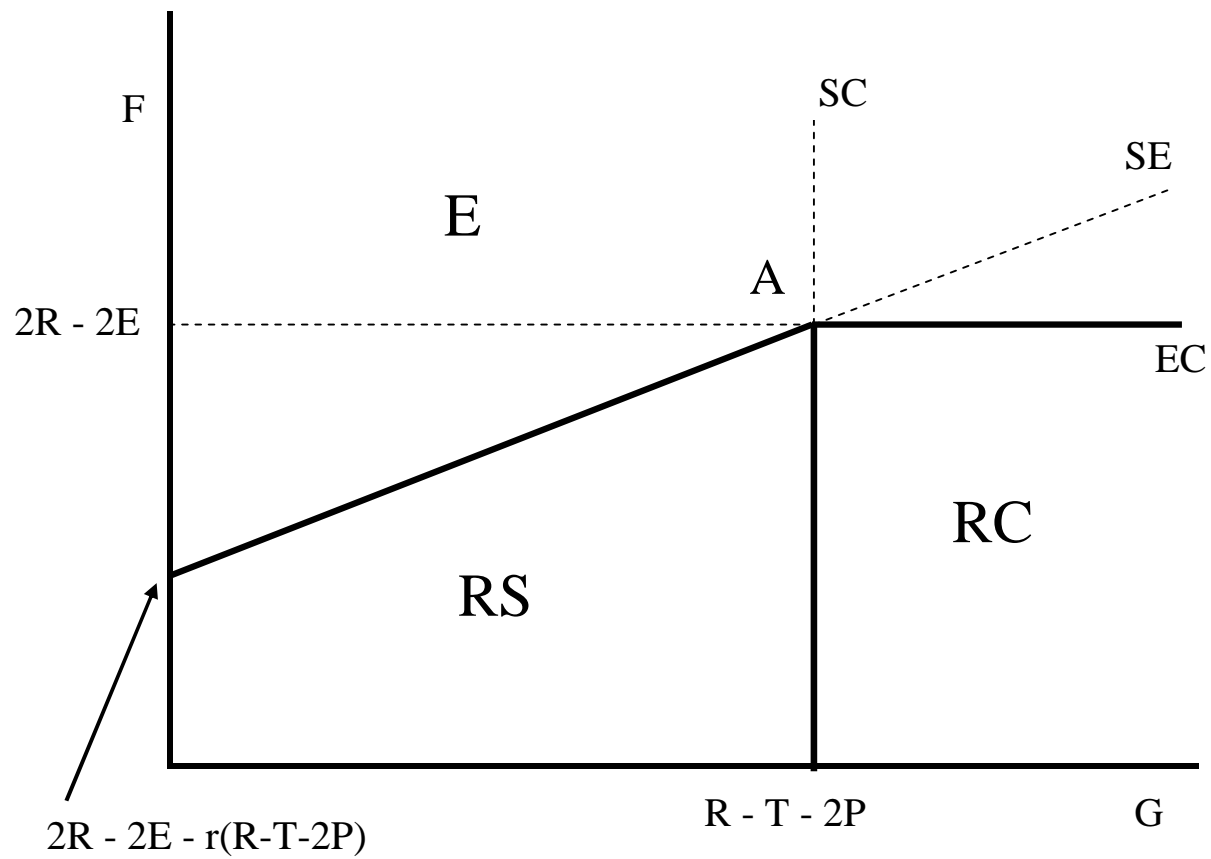
Now consider the case where the manager's IR constraint does not hold; that is, the MNE shares rents with the manager.

If $R > G + T$, the MNE can credibly offer a long-term commitment, but must share rents with the subsidiary or licensee.

The one-period rents earned by the subsidiary/licensee are larger as

- (1) r is larger (future rents are discounted more heavily)
- (2) G is small (the incentive to defect is larger)
- (3) T is small (the MNE's incentive to defect is larger).
- (4) R is larger (the subsidiary's share increase faster than R).

Figure 14.1: Values of F and G supporting alternative Modes



- (1) Horizontal multinationals seem to arise due to the joint-input property of knowledge capital, which creates firm-level scale economies and an incentive to geographically expand production abroad.
- (2) The theory that I have outlined is helpful for understanding why so much multinational activity is concentrated among the high income developed countries.
- (3) The theory also suggests that “vertical” multinationals arise when the factor intensities of different stages of production are very different, and factor prices are very different across countries.
- (4) Vertical multinationals are much less important quantitatively. Many vertical relationships are “arm’s-length”, and not internalized within a single firm. For example, Nike does not own the factories where its shoes are made, it sells designs to independent subcontractors.