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The Economics of Multinational Investment

Lecture 1, Introduction, Microeconomics Orientation

The concept of economic development embraces trade and finance and micro and macro economic fundamentals. I argue that at the core of this development is multinationalism. The broader concept of development itself includes also other considerations found in social psychology, sociology, engineering and technology and political science. Long ago, a physician by the name of Quesnet recognized the analogy between the human body with its cells and circulatory system and the social economic body with its counter circular flows among its cells of money and factor services and commodity, goods, and services. It was accounting, however, that gave Quesnet's Tableau a format of debits and credits to determine the direction of the flows from a given cell (firm or household or government). Thus money flows from households to firms are credits to the households' cash account (checking account) and debits to the firms' cash accounts (checking). The point is that many sciences have contributed and continue to contribute to the concept of economic development in the broader sense. I try to recognize other contributions either explicitly or implicitly.

At the basis of the growth of the body (in a macro sense) is the growth of the cells (firms and households and government). The aggregate of firm growth gives us a measure of macro growth in terms of gross domestic product (GDP). Much like the way heart cells will respond to the overall growth of the body, microeconomic cells (business firms) will incorporate macro information into their decision-making process. There is a difference, however. Firms can

respond to an increase in the demand for their products, but they can also anticipate or expect the demand to increase and respond. Thus, there exist a micro-macro interaction. The micro looks to the macro and responds and the aggregate of these micro responses produces in equilibrium the macro picture firms were expecting. The expectations are rational (justified by a theory) when the two pictures coincide. I try to incorporate such interactions into the micro-macro approach to multinationalism or simply multinational economics.

Early examples of micro units incorporating macro information into their decision making go back to Fellner (1960), where the firm chooses a technology based on its expectation of what the rate of growth of the wage rate (inflation) will be. If firms' decisions in the aggregate do in fact result in a given expected rate of wage increase then the expectations are called rational. In my empirical work I try to incorporate macro data into my micro models for both industrial firms and financial firms.

My definition of a multinational firm or enterprise is standard (see, Caves and Porter, 1996). A firm incorporated in one country (the Home) but with assets, profits, sales, and employees in other countries as well (the hosts) is a multinational enterprise (MNE). The subsidiaries operated by the Home may be wholly or partially owned by the Home, depending on the government rules in the host country. Affiliates are joint properties owned by the Home and host firms. A less formal linkage may exist in the form of joint-ventures. The different patterns of ownership found in multinationalism are many in number and often complex and complicated in nature.

The degree of multinationalism or what UNCTAD (WIR 2000) calls the transnational index is determined by taking the ratios of foreign assets to total assets, foreign sales to total

sales, and foreign employment to total employment and obtaining a simple average for a given number of firms or MNE's. Table III.1 (WIR 2000, p.72) shows the TNI index for each of the top 100 corporations in the world along with their country of incorporation, main products, and industries. These indexes vary a great deal from 20 percent to 96 percent. From this data alone, come two interesting hypotheses:

H1: How does the TNI index vary with the rate of growth of the GDP of the Home country?

H2: How does the TNI/GDP relationship (H1) vary across industries?

Another table of interest (Table III.9, WIR 2000, p.82) shows the TNI indexes for the top fifty MNE's in developing countries. From this table the same two hypotheses can be tested to see the extent to which multinational investment by firms in the host country (say, firms in Thailand) affects the rate of growth of Thailand's GDP. I leave the testing of these hypotheses an an exercise by the student.

The general plan of the lectures is to use well established microeconomic tools of analysis and apply them to analyzing multinational firm behavior. These tools are drawn mainly from the field of industrial organization. So, for example, when I focus on MNE's investment decision making, I am talking about foreign direct investment (FDI). The context of the analysis is what is going on in the host countries, rather than in the Home countries. An overall global investment model that considers both host and Home markets is not developed here in any detail. The task is beyond the scope of the course. It would involve, for example, modeling the US auto industry where each Home firm interacts with its Home rivals as well as with its host rivals and the host firms interact with each other as well. Later, I will develop an extended Coase

transactions cost model which goes part of the way towards a global interaction model.

Lecture 2, Macro Model and Crowding Out and Crowding In:

The crowding out/crowding in phenomenon is directed towards foreign direct investment by firms in the Home country and its effect on the level of investment in the host country. The simplest model to use is the demand for and supply of loanable funds model. Before I go into this model, it is important to first define some important macro variables. In the **WEB** link under www.econ.utah.edu/gander, the structure of FDI for product markets and financial markets is considered. Then, the loanable funds model is considered.

Economics of International Investment

FDI Structure

Product Markets

Physical Capital = Domestic Capital of host + Foreign Capital of Home

(Note: subscripts, d for domestic, s for foreign or subsidiary)

K = Kd + Ks

$$\Delta K = \Delta K_d + \Delta K_s = I = I_d + M_2$$

$$Q_d = F(L_d, K_d)$$

$$Q_s = F(L_s, K_s)$$

$$GDP = Q_s + Q_d - (\text{INTER s+d sales}) = (C - M_1) + (I - M_2) + G + X$$

$$= C + I + G + (X - M)$$

$$M = M_1 + M_2$$

Financial Markets

Balance of Payments:

$$X(Y_w, ER) - M(Y_d, ER) + NF(r_d - r_w) + OFF = 0$$

where "w" is world, ER is the exchange rate, r is the interest rate, NF is net capital flow (in is + and out is -), and OFF is official transactions to create the balance.

Domestic (host) Loanable Funds Market (LF):

Supply:

$$LF = LF_d + [FDI + FPEI] + GOV_+ + P_d$$

$$FDI = P_s + LF_s$$

$$FPEI = LF_w$$

Demand:

$$LF = I_d + I_s + G_-$$

where host household demand for LF is suppressed and government budget G can have either a surplus (+) or a deficit (-). Crowding out and crowding in will be analyzed in the context of the loanable funds market. Domestic or host profit or retained earnings (Pd) can be used for the expansion of the subsidiary or for portfolio investments in the host securities market.

The financing of any expansion (Greenfield or M/A) of a subsidiary or affiliate comes from two

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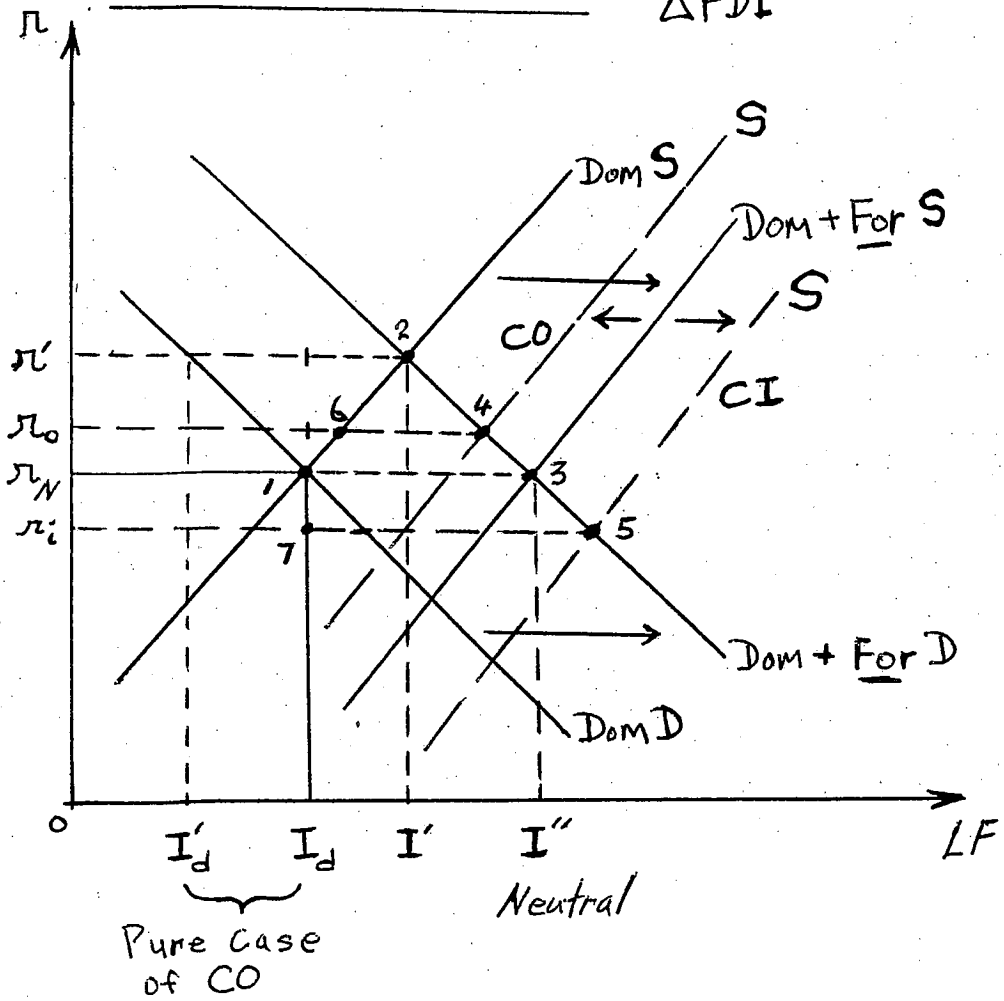
LF MODEL HAND OUT
(P. 8a)

Fig. 1 $I = FDI + DI$

CROWDING OUT (CO) $\frac{\Delta I}{\Delta FDI} < 1$

CROWDING IN (CI) $\frac{\Delta I}{\Delta FDI} > 1$



$\Pi_0 > \Pi_N$ (CO), $\Pi_i < \Pi_N$ (CI)

sources, external to the host and internal from the host market. The external source will usually consists of FDI (some from the parent Home and some from the subsidiary's profit or retained earnings) and non-FDI (portfolio flows from Home, Home bank lending from branches in host, and other international sources like IMF and WB). The internal sources are from the host financial markets. For example, for US affiliates world wide, the external was 58 percent and the internal was 42 percent for 1994. For the external, FDI was 37 percent of the 58 percent and non-FDI was 21 percent (Source: WIR 1999, Chapter VI, pp. 159-161).

Note: Physical capital equipment brought in to the affiliate in the host by the Home parent firm is recorded as a equity capital transfer-a component of FDI even though there is no actual transfer of financial resources taking place. Presumably, the real capital also shows up as an import of goods and services in the current account (Source: WIR 1999, Chapter VI, p.161).

The loanable funds model is on the same web site and will be attached to this syllabus for discussion in class. A quick in-class quiz on the model will also be handed out. <Hand out>

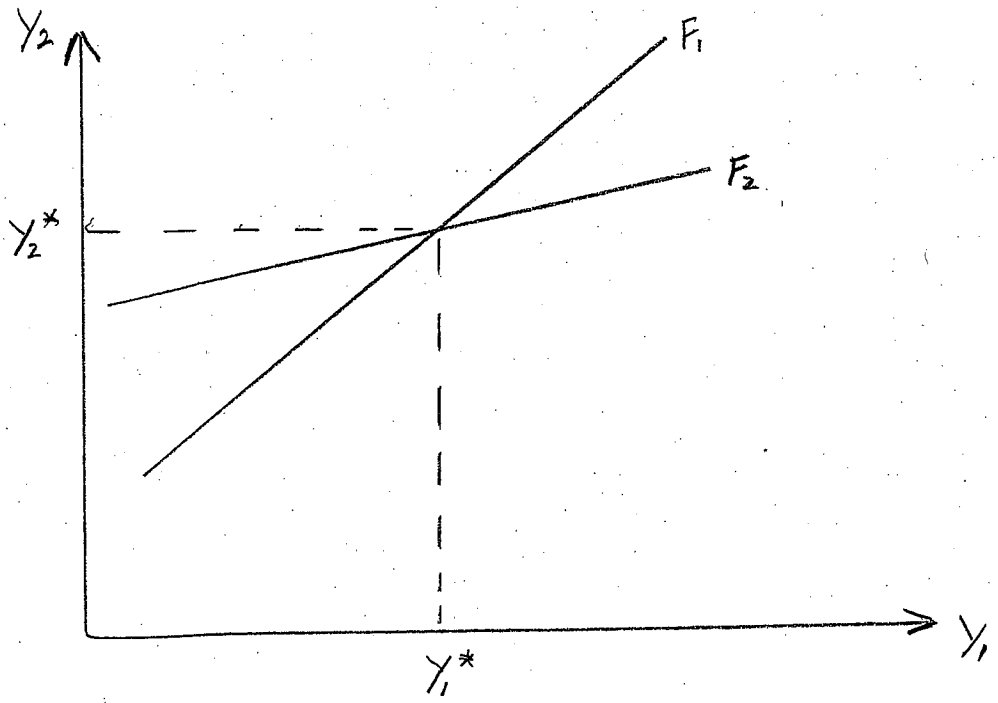
I now want to develop a typical Keynesian model to show how trade and development are related. Trade focuses on the exports and imports of goods and services. Development focuses on the real growth of GDP per capita and how this income is distributed.

Recall from the Keynesian model that Y=C+I+G+X-M, using standard definitions. In

functional form, Y1 = C(Y1-T1) + I(r, Y1) + G + X(Y2, ER) - M(Y1, ER) or simplifying to Y1= F1(T1, G1, Y2, ER, r) where T1 and G1 represent fiscal policy for country 1 and ER and r represent monetary and trade policy for country 1. Let Ai and Bi represent these policy sets for each country i=1,2 giving us the basic model (see, Stiglitz, SEJ, 1999)

1. Y1 = F1(A1, B1, Y2)
2. Y2 = F2(A2, B2, Y1).

These reaction functions can be shown graphically below where F1 must be steeper than F2 for stability of the equilibrium.

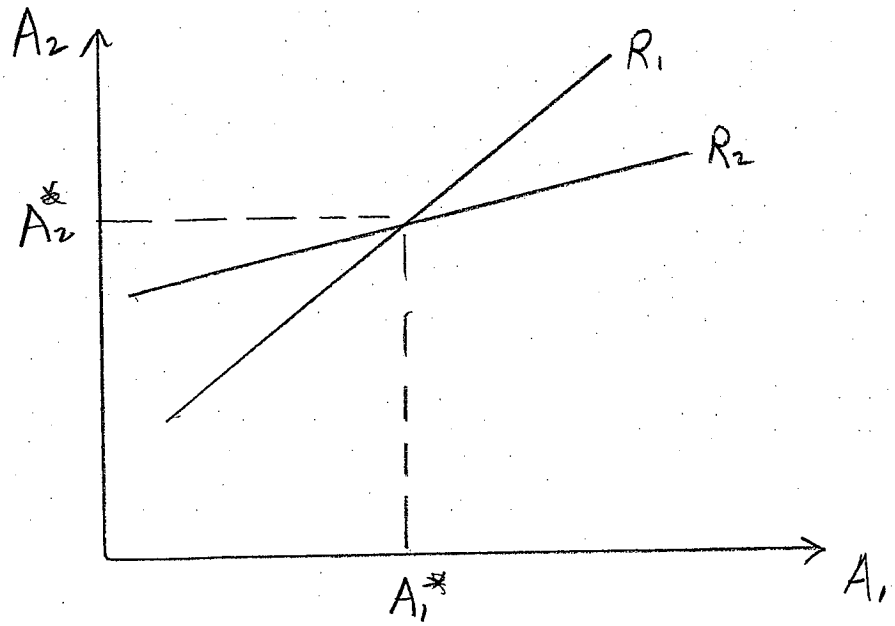


As respective country's policies change, the functions will shift out or in and change the global income equilibrium. For example, if taxes are lowered or government spending is increased or deregulation occurs (debatable!) in country 1, then F1 will shift out and both countries will benefit–both incomes will be higher. The increase for country 2 will depend on

the slope of its F2. This is larger determined by the marginal propensity to import by country 1. So, essentially, the equilibrium incomes are themselves a function of the policy sets in both countries or

1. $Y1 = Y1(A1, B1, A2, B2)$
2. $Y2 = Y2(A1, B1, A2, B2)$.

Just focusing on one set of policies, say, Ai, a game situation can be described. If country 1 selects its optimum policies A1 given country 2's policies $\overset{A}{B}2$, then $A1 = R1(\overset{A}{B}2)$, another reaction function at the policy level. Similarly for country 2, optimum $A2 = R2(A1)$. These functions can be shown graphically below with R1 steeper than R2 for stability.



A positive slope for the functions means that if country 1 becomes more liberal in terms of reducing taxes and increasing government spending, then it will "pay" country 2 to also become more liberal and the reverse is true. This is the complementary case. But, it may be possible for the functions to be negatively sloped with R1 steeper than R2 for stability. This is

the substitutional case or rivalry case akin to the Cournot output-oligopoly case. In class discussion we can explore further the implications of these cases. Remember, that from the production function side, capital and technology are key factors of production along with labor. Hence, for incomes to rise as a result of policy shifts, capital and technology must increase in the long run. This is where the FDI link comes in, when it is of the Greenfield type–new capital formation.

Lecture 3, Some Basic Tools of Micro Analysis:

In this lecture, I review some basic analytical tools used in microeconomics.

One important tool is the concept of returns to scale (and its related but different concept the returns to outlay) at the plant level and at the firm level (See, Patinkin on Cartels). When no separation is made between the concept of the firm and production, the production function itself is used to describe the firm. Entrepreneurship is taken as a datum. The firm and the plant are identical constructs. So, the returns to scale index (RTS) is defined as the ratio of the %change in output Q of the firm to the %change in all factors of production, given factor prices fixed. Thus,

(1) $RTS = \%\Delta Q/\%\Delta all \;\; => < 1,$

for constant returns to scale, increasing returns, and decreasing returns.

Under constant factor prices, the RTS index has a direct (but inverse) relationship to the shape of the plant's (firm's) long-run average cost curve. Usually, the RTS(Q) as a function of output goes through three stages (>1, =1,<1), so the corresponding efficient LAC also has three stages, falling, constant, and rising. A corresponding index is the returns to outlay (RTO) which is the ratio of the %change in output to the %change in outlay (or cost). Thus,

(2) RTS = 1/RTO or as Frisch (1965) shows,

(3) RTO= 1/RTS.

An important cost curve used in industrial organization analysis is one with initially increasing returns to scale then constant returns to scale for a lazy J-shaped LAC:

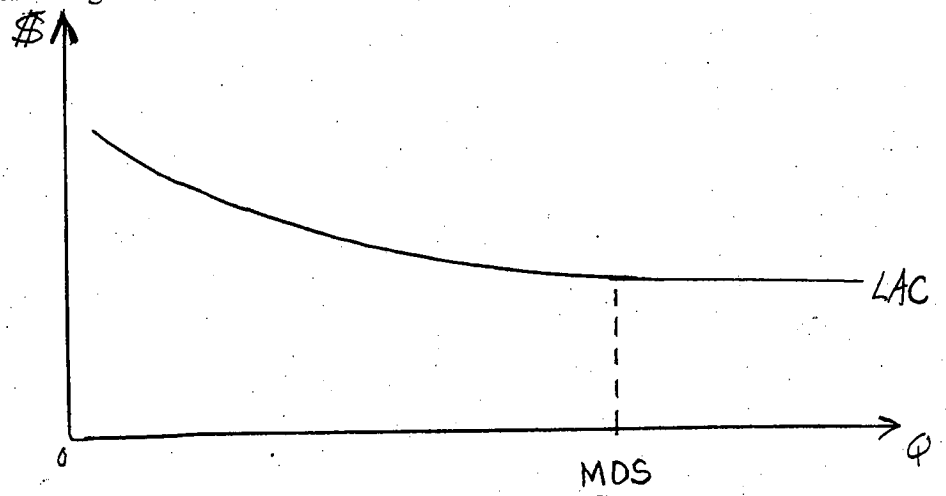


Fig. 1. Long-run Average Cost Curve

The minimum optimum firm size (MOS) occurs where the average cost flattens out. The significance of returns to scale is made up of the drop in average cost relative to the MOS as a percent of the market demand.

In modern I/O (See, Baumol, et al., 1980), the falling part of the LAC has the property of subadditivity where the total cost C(Q1 + Q2) < C(Q1) + C(Q2). The cost of the higher level of output is less than the sum of the cost of the part-output levels. This property provides the cost motivation for a natural monopoly. It can also provide the motivation for a MNE to produce (concentrate) its total output at one host country plant rather than at two or more plants in different countries. Other considerations which will be addressed by Dunning's L.O.I. model can result in a different conclusion. I discuss these later.

Because of its similarity in form , I mention another modern cost theory concept, that of

economies of scope. Such economies are said to exist if

(4) $C(Q1, Q2, Q3) < C(Q1) + C(Q2) + C(Q3)$,

the total cost of producing several different but technically related products in one plant is less than the cost of producing the products separately in three different plants. The economies result from the sharing of certain inputs by the products, for example, warehouse space, research and development facilities, administration, and selling activities. A MNE can locate its production of several products in its host country plant rather than at several plants at different locations. Again, L.O.I. considerations will affect the analysis.

Returning to equation (3), the technical-cost relationship is more complicated when input prices are not fixed but endogenous and vary with the levels of inputs used (as in the monopsony or oligopsony cases). In one treatment it can be shown (See, Frisch, 1965) that

(5) $RTO = RTS/(1+\eta)$

where η is the average of the inverse of the elasticities of supply of the various inputs used. Thus, it the direct elasticity of supply is infini9te, its inverse is zero and if all inputs are like that, then $\eta = 0$ and we obtain (3) again.

Of what significance is this more complicated relationship between cost and output? If RTO = 1, so there is constant returns to scale, then if input supply elasticities (inverses) average (say) 2, then RTS = 3. So while physical returns to scale are still increasing, due to the input supply conditions, the returns to cost are constant. A motivation for MNE location is to find a location where η is as small as possible (possibly zero). The monopsony or oligopsony case is also a consideration here. If a MNE in a host country is the only buyer of a particular type of labor, for example, then RTO and RTS will differ. More will be said on this later.

When the assumption of a single product firm is dropped and a multi-product, multi-plant firm is considered, the cost curves for each plant remain in tack as defined for the fixed-input prices case. However, now we can no longer ignore the distinction between the firm and the plants. The many plants must now be coordinated by an administrative unit, called here management for short. In the typical Patinkin case, as the firm expands in size (output) by adding more and more plants, each operated at its MOS, economies of administration can occur, a synergism, where the average cost curve for the firm (not the plants) falls, as shown for the lower firm LAC below.

Thus, it may profit a MNE to scatter its plants of a given size all over the world to achieve firm wide economies of scale. Again, the L.O.I. considerations have to be recognized in order to explain multinationalism.

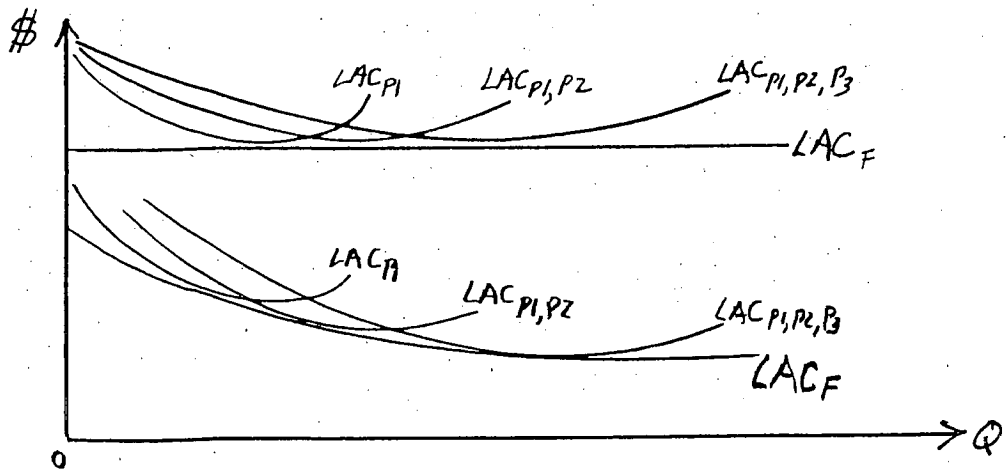


Fig. 2 . Firm cost with/without synergism

Lecture 4, Three Simple Firm Models to Analyze Multinationalism:

In this lecture, I examine the 1) cartel model, 2) the make or buy model, and 3) the

investment under uncertainty model.

1. The Cartel Model:

I use the cartel model to analyze the performance of a multi-plant monopoly MNE. In the figure below, the firm is assumed to be a monopolist at Home and supply its market from two

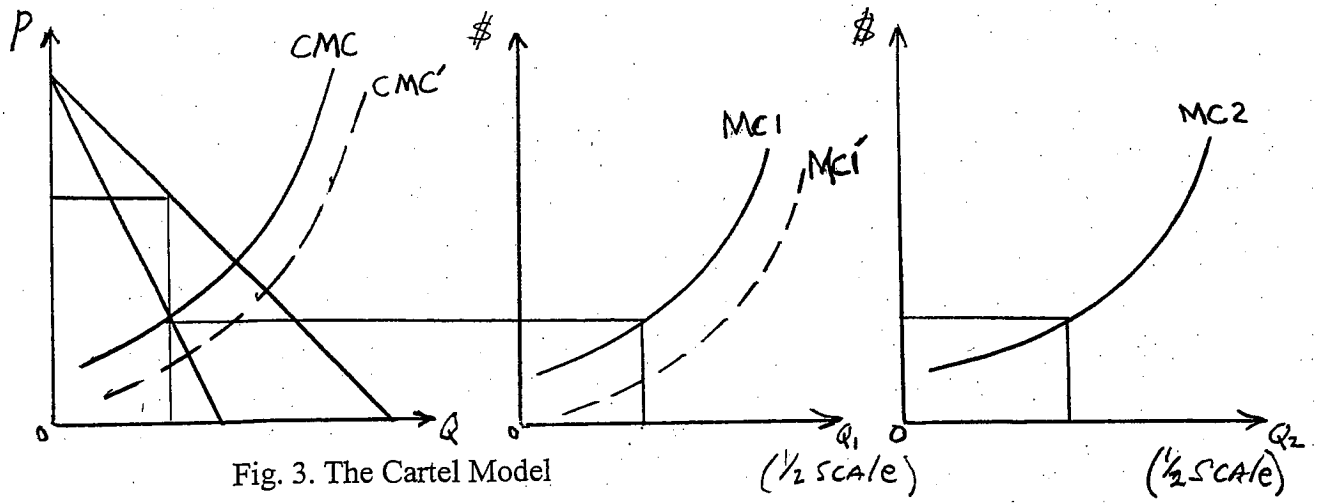


Fig. 3. The Cartel Model

plants whose locations are domestic to begin with. The equalization of MR=CMC=MC1=MC2 rule for profit maximization gives the P-Q solution and the quotas for each plant (only two are considered here due to space limitations).

Now, assume that the firm shifts one of its plants (one to keep it simple) to a host country, so now it is a MNE. The motivation for the shift can be one of Dunning's Location advantage factors, say, lower wages–low enough to offset transportation cost and the cost of doing business in a foreign country. As a result, the MC1 curve shifts down (along with the average cost curve not shown) and the combined marginal cost curve (CMC) also shifts down (see dotted curves). The new performance picture has a lower price and greater output. Profit is also higher to justify the plant shift. Consumers' surplus (given by the area beneath the market demand curve and above the price line has also increased. Foreign direct investment (FDI) to the host country has

increased along with an increase in sector employment. The issue of trade-creating vs trade-diverting with respect to the economic benefits to the host country will be discussed later in the course.

The further usefulness of this simple cartel model for analytics can be seen by now changing the monopoly assumption. Say, the firm's market demand curve is now a residual demand given its Home rivals' share in the total market. Then, we have a Cournot-type oligopoly problem complicated by the location of plants throughout the world.

2. The Make or Buy Model:

Here, I show how the make or buy model (See, Gould) can be used to analyze a vertical combination in the context of multinationalism. By relocating its "making" plant, the firm takes advantage of the Dunning factors in the L.O.I. model. The marginal cost curve for producing the y input is shifted down, in the figure below.

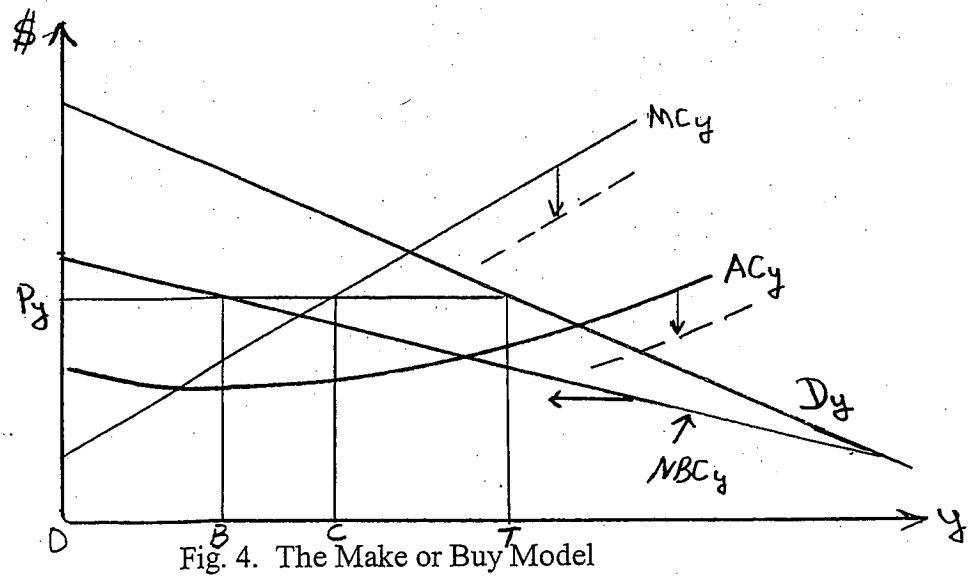


Fig. 4. The Make or Buy Model

In the figure, D_y is the demand for the intermediate input of production y for an output production function of the form, $Q = f(y, L, K)$, using standard notation. The input demand curve

is, in effect, the net marginal revenue product curve. MCy and ACy are the marginal and average cost curves for the plant that produces the y input (its own production function is of the form y = f(l, k, m)). The net buying curve (NBCy) is the difference, (Dy -MCy). If, for example, the off-the-shelf market price is given by Py, then the total y demand is OT and OB is purchased in the market and OC is produced by the firm's y plant. The index of vertical integration is given by VI = OC/OT <= 1.

Now, when the MNE takes advantage of an L.O.I. factor (like lower wages in Thailand or China) and shifts its y plant to the host country, then assuming a facorable business climate, the MCy curve shifts down (along with the ACy curve), the NBCy curve shifts to the left and the VI index increases. As a result of the plant shifting, FDI is also increased.

The analysis is virtually the same, even if no ready market exist for the input y, due to its patent uniqueness, say. The VI index, of course, would not apply then. On the other hand, if there is an oligopsony market for the y input, to avoid the hassle with rivals, the firm may be motivated to shift its y plant overseas.

3. Foreign Investment Under Uncertainity:

Using a fairly standard microeconomic concepts, I present a theory of foreign investment under uncertainty. Only the host market is considered. The uncertainty can have one or more sources, such as, host demand uncertainty, or cost uncertainty due to labor problems, vendor problems, governmental policies, or cultural acceptance problems. In any case, we model the subsidiary of the MNE located in the host country. The analysis abstracts from the MNE's Home activities.

We postulate two economic events, good times and bad times with their respective

subject probabilities P and 1-P. Expected profit is maximized with respect to the level of foreign investment, Kf.

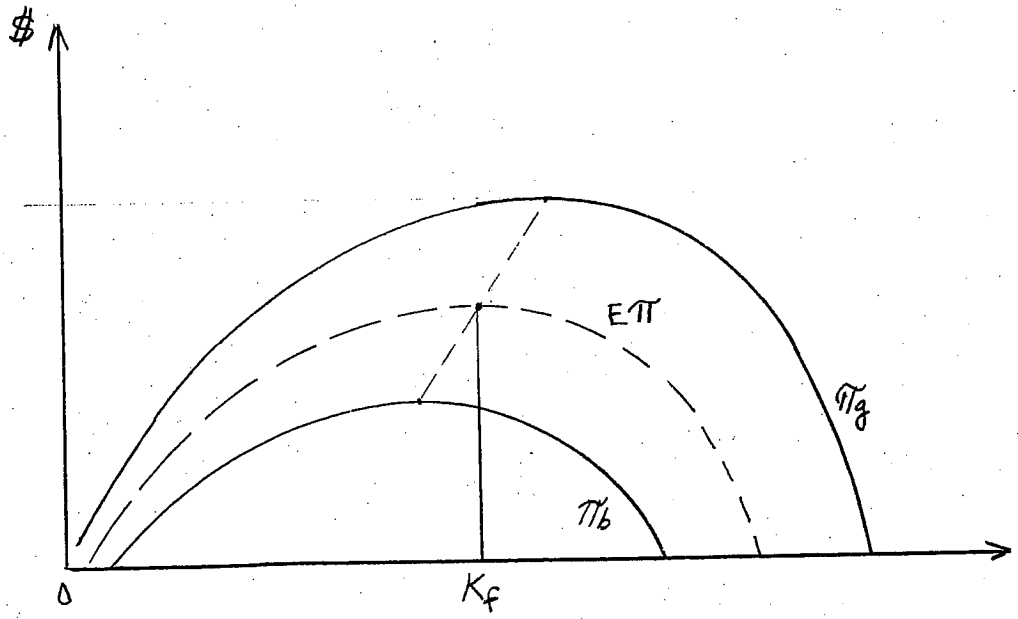


Fig. 5. Investment Under Uncertainty

In the figure, πb is the profit function possible under Bad times, πg is the profit function under Good times, and the expected profit function is given by:

(5) $E\pi(Kf) = P\pi g(Kf) + (1 - P)\pi b(Kf)$,

where P is the probability of good times. The equilibrium marginal rule is given by:

(6) $P/(1-P) = -(M\pi b)/(M\pi g) > 0$,

where $M\pi b$ is marginal profit in Bad times as a function of Kf and $M\pi g$ is marginal profit in Good times. Since the solution lies between the two peaks of the profit curves, $M\pi b < 0$ and $M\pi g > 0$.

Clearly, as the probability P of Good times increases, FDI, or Kf, also increases. Since P is perceived by the MNE based on economic, political, and cultural conditions in the host country (relative I might add to other countries and Home), we have the makings of a Cournot-type game

model here.

4. Cournot Game for Business and Government:

Assume for now that the host government can in some way control its economic environment, given by β as a set, by spending C amount. So, it can derive a net social benefit function of the form given by:

(8) $NSB = B(Kf, \beta) - C(\beta)$,

where B is gross benefits due to the FDI, Kf, given β and C(β) is the cost of creating the β business climate.

As I argued earlier, P will depend on the firm's perception of the business climate so it will depend on β. So, for a given β (and, thus P), the MNE invests optimally Kf, to give a reaction function $Kf = F(\beta)$. Similarly, for a given Kf, the government will maximize NSB by spending C to create β. Another reaction function of the type $\beta = G(Kf)$ can be derived.

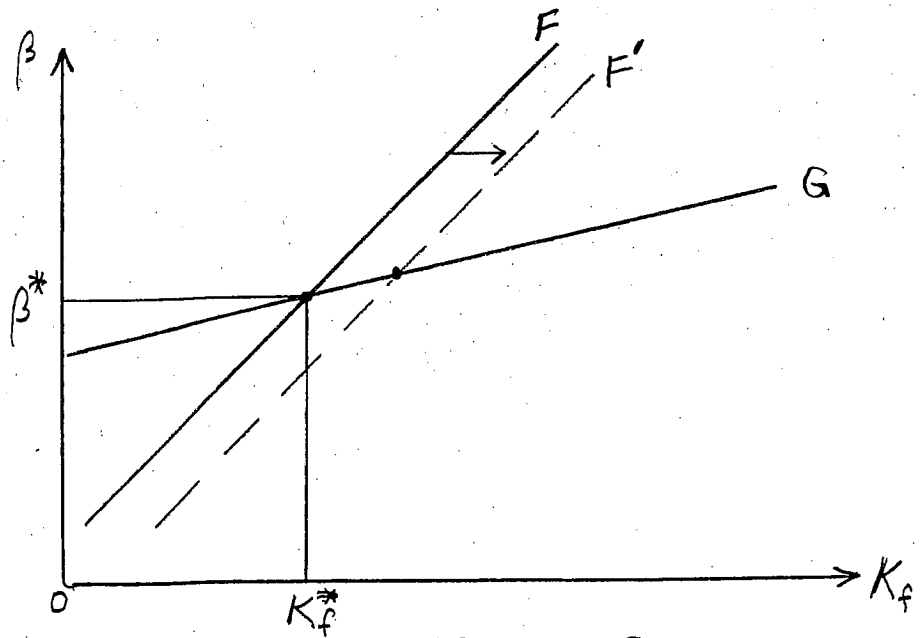


Fig. 6. Business and Government Game

In Figure 6, we depict graphically the two reaction functions given above. The firm's

reaction function must be steeper than that for the government for stability. Reading the functions (or rules of behavior for the game), as β increases (improved climiate), the firm's P increases and foreign direct investment increases. Similarly, as Kf increases, the government is motivated to improve the business climate given by β. For a stable equilibrium, the equilibrium occurs where the two functions intersect. The F function will shift out due to such parameter (hidden here) changes as product improvements. The new solution gives more investment and a better business climate.

Parameter changes which affect gross benefits to the host country will result in an upward shift of the G function. Again, β and Kf will increase. Thus, there exists a complementary relationship in this game.

Lecture 5, International Trade and FDI:

In this lecture, I attempt to integrate at the micro level international trade and multinationalism. The traditional argument has been that trade and FDI are substitutes. A country could export to another country or it could build a plant in the host country and sell from it. The alternatives were viewed as substitutes. The argument is sound from a static viewpoint. When one considers, however, that much of trade today between countries is in the form of intermediate goods, produced here, exported to there, value-added and re-exported back to here, where the plant is owned by the initial exporter, trade and FDI are complements. The more plants a MNE has abroad, the more trade activity there is.

Also, the traditional argument ignores the income effect of the FDI and the subsequent increase in the demand for imports on the part of the workers at the plants in the host country. The more FDI, the faster GDP grows, and the more the host country wants to import. So, trade

and FDI are complements.

The traditional argument is shown graphically with the Horst's model (See, Caves , 1996, p. 28). In Figure 7, attached, we show the firm's Home market as a monopoly. The firm has a subsidiary plant in the host country producing the same product as at Home. Thus, the Home firm produces and sells at Home, but it also exports the residual to its host plant such that the MCx = MCs - MRq , where MCx is the marginal cost of exporting (see center frame), MRq is the marginal revenue from Home sales Q, and MCs is the marginal cost of Home production S. Note, the differences are being equalized horizontally, but at different levels of output. The residual exports X = S - Q. If S = Q, then exports are zero, MR(Q) = MC(S), so the intercept for the MC(X) curve is at MC(S) level. As S rises and Q falls, MC(S) rises and correlates with the rising X, producing the MCx curve in the figure.

In a similar way, differencing gives kthe marginal revenue from exports MRx (see center frame) by the equation, MRx = MRq - MCs for the monopoly subsidiary in the host country (see the right frame). Where MCx = MRx there is an equilibrium in all frames. The Home has PH and QH purchases. The host market has Ph price, Qh purchases, Qs production, imports (=X) = QM = Qh - Qs.

So far, the MNE is exporting to its subsidiary (intra firm sales) and the subsidiary is adding to the imports its own production (which could be near zero) to supply Qh. Now, to test the substitution theorem, add a tariff, insurance charge, or shipping charge (all labeled t) to the MCx vertically to shift the curve up. At the new equilibrium, X is smaller, SH is smaller but QH purchases are larger so the Home price PH falls. At the subsidiary, total sales Qh are smaller, X (= imports) is smaller, but subsidiary production is greater (and, thus, in the long-run case, FDI is

Chp 2 Curves

(Fig. 7)

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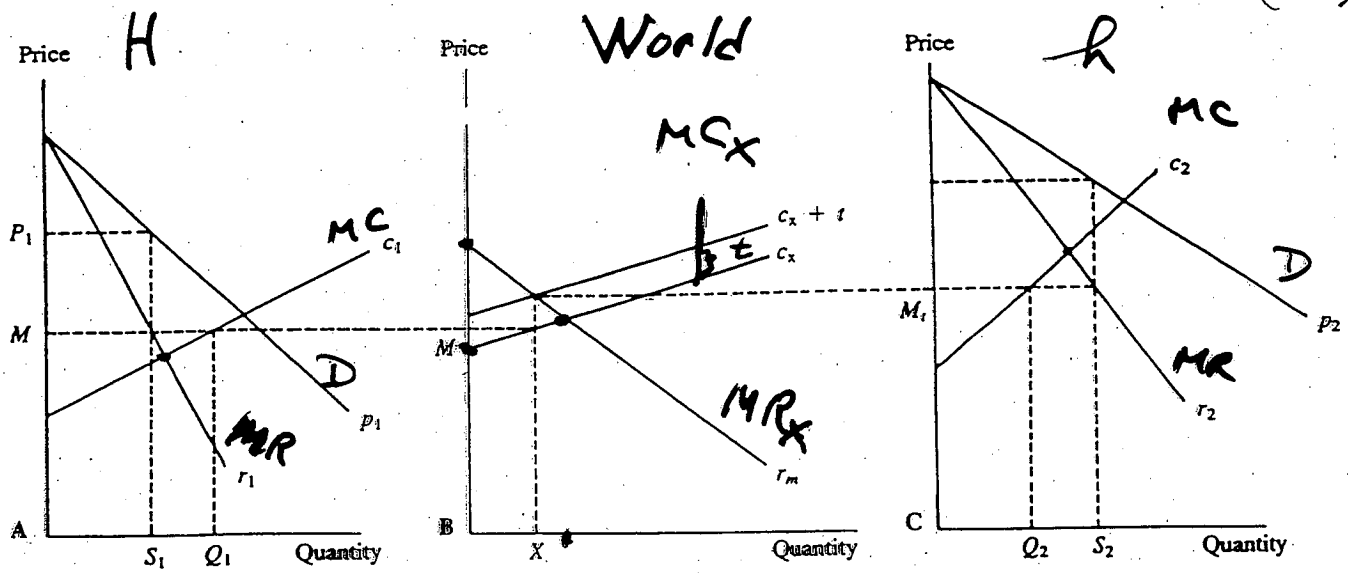


Figure 2.1. A: Revenue and cost functions in Home country. B: Intrafirm trade. C: Revenue and cost functions in Foreign country.

Monopoly

Monopoly

$$MC_X = MC_H - MR_H$$

$$MR_X = MR_h - MC_h$$

So: with MS $S \downarrow C$, $\uparrow S_h = X_H + FDI_H \downarrow$

So: In Home, $Q_H \uparrow$, $S_H \downarrow$, $P_H \uparrow$, $Q_H = D_H + X_H$ ($\uparrow$ $\downarrow$ $\uparrow$)

So: as country t in host, Home market better MS for $P_H \downarrow$.

So: host - country tariff $t \uparrow$, $S_h \downarrow$, $P_h \uparrow$

$FDI_h \uparrow$, $X = M_h \downarrow$

greater) and Ph is higher. Thus, trade falls and FDI increases, the substitution effect. Note, the product is a final product.

What are the benefits to each country of the host restricting trade by imposing a tariff, t? The Home buyers have more consumer surplus. Employment, however, is lower. At the host country, buyers' surplus has fallen, but employment and FDI have increased. The income effect of the increased employment will increase, in the long run, the demand for other imports, so trade and FDI are now complements. Empirically, this certainly has been the case over time. By the MNE shifting its production off shore, FDI and subsidiary exports increase.

Lecture 6, The Dunning Model:

I have alluded to the Dunning model earlier several times. In this lecture I give a detailed treatment of the Dunning eclectic model of Location, Ownership, and Internalization (LOI) advantages. These advantages go a long way toward explaining the growth of multinational firms or MNE's. A formal list of the advantages is given in Readings #5 and #6 (attached) and an application to cross-border M&A's is in WIR2000 (attached). I will focus on a few advantages.

One of the key location advantages is lower wages in the host country, yet due to the technology today (which emphasizes modular production), labor productivity is still high. Hence, unit labor cost of production is relatively low. In addition to this human resource advantage, the existence of a natural resource in the host country can be an obvious location advantage. Tin in Malaysia, oil in Indonesia, and copper in Thailand are examples. In rare cases when the natural resource is owned by the MNE, ownership advantage also comes into play.

At the core of Ownership Advantages are the proprietary assets–assets owned by the

Table 3.3 *Identifying the Main Ownership and Location Advantages*[a]

Determinants	*By Industry and/or Country*
Ownership Advantages: Specific Determinants	
1 *Access to Productive Knowledge*	
(a) Skilled (professional and technical)/ unskilled labour ratio*	Home cf. host firms
(b) R & D as percentage of sales*	Home cf. host firms
2 *Economics of the Firm*	
(a) Size of enterprise*	Home firms
(b) Relative size of enterprises	(Average) Home cf. host firms
(c) Number of non-production to all workers* *or* wage bill of non-production to all workers *or* non-production[b] costs/total costs* (gross output) *or* R & D plus advertising costs to total costs (or sales)*	Home firms
(d) Capital/Labour ratio	Home firms
3 *Opportunities for Investment*	
(a) Size of local market	(Industry) sales of host firms
(b) Size of local market plus exports	(Industry) sales of host firms
4 *Diversification Indices*[c]	
(a) Average number of countries MNEs operate in* or	Home firms
(b) % of foreign/total production of home firms*	Home firms
(c) % of intra-group exports to total exports of MNEs*	Home firms
(d) Number of product groups in which parent companies produce *or* % of output of main product group to all output*	Home firms
(e) % of shipments from multi-plant enterprises to total shipments (in home country)*	Home firms
5 *Market Concentration*	
(a) Percentage of output of industry accounted for by x largest firms	Home firms
6 *Efficiency*	
(a) Wage costs (per man hour) of production workers	Foreign affiliates as % of home firms
7 *Resource Availability*	
(a) % of main material(s) imported*	Either import/export ratio of home firms *or* % imports to total consumption
(b) % of main material(s) used in production process	% of main matrial costs to gross output
8 *Product differentiation*	
Advertising/sales ratio	Home firms

Table 3.3 (*cont*)

Determinants	*By Industry and/or Country*
9 *Oligopolistic Behaviour*	
Entry Concentration Index	
Knickerbocker PhD thesis	Home firms in host countries
Ownership Advantages: General Determinants	
1 *Productivity*	
Net output or sales per man	1 Home firms cf. host firms 2 Foreign affiliates cf. host firms
2 *Profitability*	
Profits/assets or sales	1 Home firms cf. host firms 2 Foreign affiliates cf. host firms
3 *Growth*	
Increase in sales	1 Home firms cf. host firms 2 Foreign affiliates cf. host firms
Location Advantages: Specific Determinants	
1 *Production Costs*	
(a) Wages per man hour	Home firms cf. host firms
(b) Energy costs (e.g. electricity or oil)	Home firms cf. host firms
(c) Material costs (cost of major inputs; or commodity price indices for main materials) *or* some index of resource availability	Home firms cf. host firms
(d) Tax rates (including, where possible, tax allowances)*	Home firms cf. host firms
(e) Average number of countries MNEs operating in	Home firms only
2 *Transfer Costs*	
(a) Transport costs	Home-host country
(b) Tariffs	Host country
(c) Non-tariff barriers	Host country
3 *General*	
(a) Political risks	Host country
Location Advantages: General Determinants	
1 *Productivity*	
(a) Production costs per man *or*	Home firms cf. foreign affiliates
(b) Net output or sales per man	
2 *Profitability*	
Profits/assets or sales	Home firms cf. foreign affiliates
3 *Growth*	
Increase in sales	Home firms cf. foreign affiliates

[a] Internalizing advantages marked with an asterisk.
[b] Non-production = pre- + post-direct production costs.
[c] (a)–(d) specific to MNEs; (e) general to multi-plant enterprises.

O.L.I. Model (226) (#6)

Table 3.1 *Types of International Production: Some Determining Factors*

Types of International Production	*Ownership Advantages (The 'why' of MNC activity)*	*Location Advantages (The 'where' of production)*	*Internalisation Advantages (The 'how' of involvement)*	*Illustration of types of activity which favour MNEs*
1 Resource based	Capital, technology, access to markets	Possession of resources	To ensure stability of oil supply at right price. Control of markets	Oil, copper, tin, zinc, bauxite, bananas, pine-apples, cocoa, tea
2 Import substituting manufacturing	Capital, technology, management and organ-isational skills; surplus R & D and other capacity, economies of scale. Trade marks.	Material and labour costs, markets, government policy (e.g. with respect to barrier to imports, investment incentives, etc.)	Wish to exploit technology advantages, high trans-action or information costs, buyer uncertainty, etc.	Computers, pharma-ceuticals; motor vehicles, cigarettes
3 Rationalised specialisation (a) of products (b) of processes	As above, but also access to markets	(a) Economies of product specialisation and concentration (b) Low labour costs, incentives to local production by host governments	(a) As type 2 plus gains from interdependent activities (b) The economies of vertical integration	(a) Motor vehicles, electrical appliances, agricultural machinery (b) Consumer electronics, textiles and clothing, cameras, etc.
4 Trade and distribution	Products to distribute	Local markets. Need to be near customers. After-sales servicing, etc.	Need to ensure sales outlets and to protect company's name	A variety of goods, particularly those requiring close consumer contact
5 Ancillary services	Access to markets (in the case of other foreign investors)	Markets	Broadly as for types 2 and 4	Insurance; banking and consultancy services
6 Miscellaneous	Variety – but include geographical diversification (e.g. airlines and hotels)	Markets	Various (see above)	Various kinds (a) Portfolio investment in properties (b) Where spatial linkages essential, e.g. airlines and hotels

DUNNING'S BOOK.

(25c)

Box V.2. The OLI paradigm and cross-border M&As

The OLI paradigm (Dunning, 1993) addresses three questions related to FDI:

Which firms undertake FDI? Firms investing abroad must possess specific proprietary or ownership ("O") advantages to overcome the extra costs of operating in a different, less familiar environment. These advantages are generally costly to create, but can be transferred to new locations at relatively low cost. The analysis of "O" advantages draws on industrial organization, resource based, evolutionary and management theories, with advantages residing mainly in firm-specific technology, brand names, privileged access to factor or product markets or superior technological or management skills. Initial "O" advantages allow firms to grow and invest abroad, but size and international spread can, in turn, feed back and provide new advantages (accessing capital markets and information, spreading risks and so on). In some cases, firms may go overseas to supplement or enhance their existing "O" assets ("asset-seeking" FDI) seeking synergies between their own strengths and those of foreign firms or institutions.

Where do firms choose to exploit their advantages, in the home country (by exports) or abroad, and in which foreign locations? They select sites with location ("L") advantages that best match the deployment of their "O" assets. The analysis of "L" advantages draws on trade and location theory, the main factors determining comparative costs being factor and transport costs, market size and characteristics, and government policies (e.g. stability, predictability, tariffs, taxes and FDI regulations). Asset-seeking FDI is drawn to locations with strong technological, educational or information creation activities.

Why do firms choose to internalize their advantages by direct investment in preference to selling them to other firms? The analysis of internalization ("I") draws on transaction-cost theories of the firm, and centres on the feasibility of and returns to contracting the sale of intangible advantages to other firms. The most valuable and new advantages tend to be internalized, since these are the most difficult to price and contract over time. The more mature ones are easier to price, less subject to uncertainty and less valuable to the owner: these are licensed more readily. Internalization can also explain vertical FDI, where a particular process or function is located abroad by TNCs to serve its production system (rather than subcontracted to independent suppliers). Transaction-cost analysis can also help explain why it is difficult or costly to contract independent firms for such arrangements, particularly in technology-intensive or strategic activities.

While the paradigm does not explicitly distinguish between different modes of FDI entry, the origins of the paradigm were more in greenfield investments than M&As. On the "ownership" side, the original thesis on which it draws explained the growth of United States companies in terms of an industrial organization analysis of barriers to entry in setting up new facilities (Hymer, 1960). The extension made to multi-plant operations again was conceived in terms of firms setting up new plants (Caves, 1971). The "internalization" analysis was based upon work explaining how firm boundaries were drawn in terms of the costs of hierarchical control (internalization) versus market control (externalization) of their assets (Coase, 1937; Williamson, 1971). The implicit setting was the expansion of firms by the building of new facilities rather than the joint internalization of assets by different firms involved in M&As. With regard to international investment in developing host countries, the analysis was entirely conducted in terms of greenfield FDI. Until recently, cross-border M&As in these countries were rare.

It is therefore useful to consider OLI factors specifically for M&As, and to distinguish mergers from acquisitions (box table V.2.1). Mergers are taken to involve firms of roughly similar size and capacity that jointly internalize their "ownership" advantages to gain economies of synergy, size and scope. Acquisitions are taken to involve larger, more powerful or better capitalized firms taking over smaller or weaker ones, and using this to gain speedy access to the latter's "ownership" and "locational" assets. The OLI factors can be considered separately for the three main types of M&As (horizontal, vertical and conglomerate), bearing in mind that horizontal transactions account for nearly two-thirds of cross-border M&A activity (figure IV.2).

Cross-border M&As and their characteristics call for an adaptation of the conventional analysis. The fact that M&As

/...

(25d)

Box V.2. The OLI paradigm and cross-border M&As (concluded)

allow investors much faster access to, or offer new, ownership advantages accounts partly for their growing use in the current international competitive environment. The internalization factors are also different in that there is *joint* internalization, particularly in M&As between similar firms. In addition, the traditional OLI paradigm does not take into account non-economic explanations, such as personal motivations of managers or corporate responses under strategic interdependence.[a]

The traditional OLI analysis of locational factors is thus not particularly relevant in explaining mega mergers between TNCs, pooling not only their ownership-specific advantages, but also the global locational advantages of their worldwide production networks. The framework can still be applied to acquisitions by more advanced firms of less advanced ones — and so to FDI flows from developed to developing countries or economies in transition.

Box table V.2.1. The OLI paradigm and cross-border M&As

Type	Horizontal	Vertical	Conglomerate
Mergers	O: Both firms have O advantages complementing each other in scale, synergy, finance or market power. L: Standard location factors are not relevant where two TNCs merge their global production systems. I: Both firms seek to gain economies of scale by internalizing joint advantages. Joint internalization differs from "internalization" in usual OLI terms, but determinants (transaction costs in some sense) are similar. Mergers provide a much faster way of exploiting each other's advantages.	O: Both firms have O advantages that complement each other in different processes of the production chain. L: As with greenfield FDI, but also see horizontal mergers. I: Merging firms both seek to gain security, information, finance or market power, and to reduce transaction costs.	O: Both firms have O advantages in unrelated activities that may have economies of scope, but not technological complementarity. A merger is thus not based on O advantages in the usual sense; it may just involve access to finance. L: Mainly market size/growth or prospects of capital appreciation, not location advantages in the OLI sense. I: Merging firms seek a larger capital base or economies of scope, but are not internalizing their O assets to save on transaction costs.
Acquisitions	O: Acquiring firms tend to have greater O advantages than acquired firms, or seek specific new O advantages (technology, contacts, etc.). L: As with greenfield FDI, except that many L advantages are "embodied" in the acquired firm. I: As with greenfield FDI, acquiring firms strengthen their competitive positions by internalization.	O: Acquiring firms have a stronger financial or managerial base that allows them to acquire vertically linked firms abroad. L: As with horizontal acquisitions. I: As with greenfield FDI, acquiring firms strengthen their competitive positions by internalization.	O: Acquiring firms have greater financial and/or managerial resources, but no O advantages in the usual sense. L: Mainly market size and growth and prospects of capital appreciation, not location advantages. I: Acquiring firms seek diversification or economies of scope, but are not internalizing in an OLI sense.

Source: UNCTAD.

Source: UNCTAD.

[a] In recent work, the need for adapting the OLI framework to meet new situations has been acknowledged; see Dunning (1998 and 2000).

MNE (either tangible or intangible) and which can only earn a return if used by the MNE (or leased to another user). Examples of such P-assets are managerial resources, advertising logos and trade marks, geographical site locations integral to the firm's public image, and patents and trade secrets. The firm can sell its patents or lease their use for a royalty fee. But, here the firm must be careful that the lessee is not just leasing exclusive rights for strategic reasons to prevent rivals from using the patents. Also, there is the problem of incomplete contracts and maintaining control.

1.) The Penrose Firm Growth Model:

A useful example of the P-asset problem is Penrose's (1970) growth of the firm model. The P-asset here is managerial resources used in the past to plan and execute firm growth. These resources are inherited from the past and provide the motive for future planning, the means to carry out the growth, and the limit to the extent of growth or firm expansion.

Let $M = M1 + M2$, where M is the total amount of managerial resources (however measured), M1 are the resources used to operate the current firm size (administrative operating expenses), and M2 are the planning resources inherited from the past. For simplicity of presentation, we assume that M1 and M2 are homogeneous and substitutes but have different uses. Let "a" be the technical managerial cost per unit of expansion. Thus,

(9) $(M - M1)/a = M2/a = \Delta S,$

where ΔS is the amount of size expansion or investment. The rate of growth is then $G = \Delta S/S$. So, M2 provides the motive, the means, and the limit to growth. The coefficient "a" will vary with the type of growth, greenfield (new capital formation) or merger and acquisition. It will also vary with the industry structure (some industries are more difficult to expand in compared to

others) and whether growth is horizontal, vertical, or conglomerate.

2.) Coase's Transaction Costs Model:

Here, I apply Coase's orignial model (1937) explaining the size (or boundary) of the firm by the marginal cost (MC) of internalizing activities relative to the marginal value (MV) of the activities. The boundary relates to the division between administrative control of resource use relative to the market control of resource use. The cost relates to the managerial cost or administrative cost of adding an activity (e.g., product, inputs, finance, selling, personnel, health benefits, legal staff, and similar). The value relates to the benefits the firm gains by having the activity under its direct control as opposed to purchasing the activity in the market and incurring transaction costs. For example, the firm can "farm out" its payroll bookkeeping activity to another firm or it can set up its own payroll department and do the bookkeeping itself (internalize it). By doing it itself, it has to set up a payroll department and staff it. This is the marginal cost. The marginal value is the reduced hassles with the vendor, missed dates, incomplete contracts, legal headaches for errors, and other transaction costs. The equilibrium firm size is where MC = MV.

In the case of a MNE, its size is made up of two interdependent units, the Home activities and the host activities (See my web page for more details under the Pure Theory of Multinational Enterprises). In symbols, the net profit from administration is given by

(10) $\pi(H, h) = V(H, h) - C(H, h)$,

where profit depends jointly on H and h sizes, V(.) is the net value from internalizing, and C(.) is the administrative cost of internalizing. The joint profit maximizing equilibrium is given by (omitting policy parameters such as α for controlling the effectiveness of advertising, β for

controlling the effectiveness of research and development, and θ for controlling inter-firm coordination (or oligopoly rivalry):

(11) $MVH(H, h) = MCH(H, h)$

$MVh(H, h) = MCh(H, h)$.

The graphic solution is given by Figure 8 (attached and also on my web page).

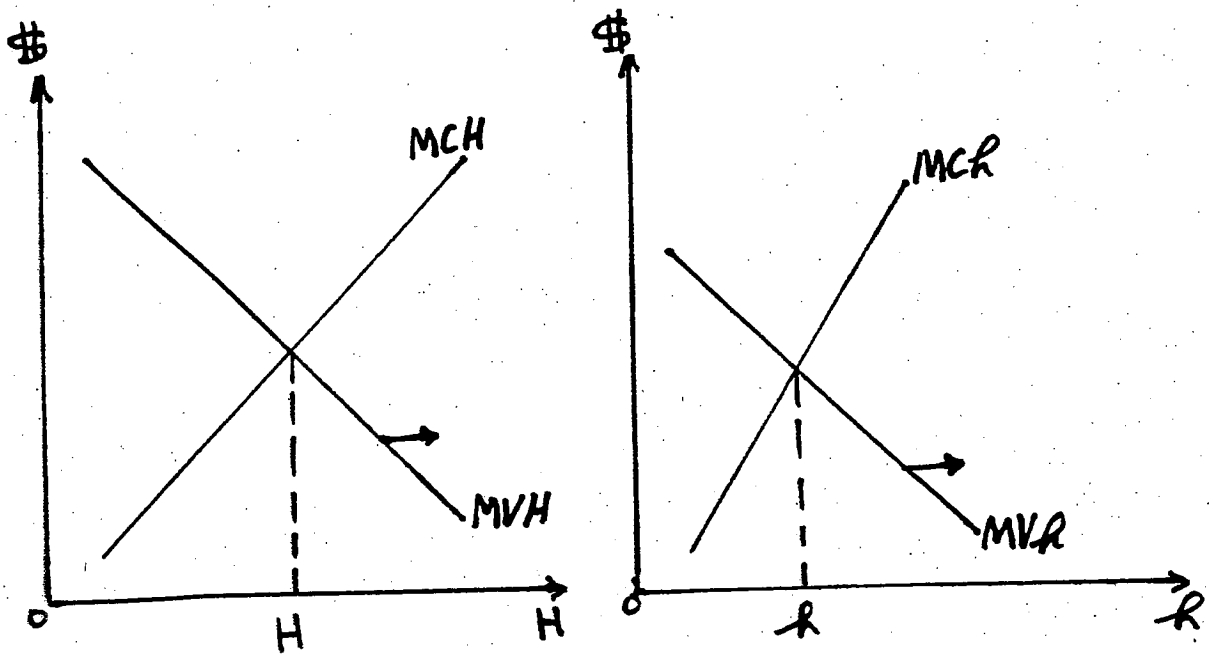
The interesting analysis with this model occurs when shifting of the functions is considered by changing the parameters α, β, and θ, defined earlier. The important assumption concerns the concepts of complementarity and substitutability with respect to the sizes H and h. In the case of complementarity, if MVH shifts out so H increases, then either MVh shifts up or MCh shifts out, so size h is also increased.

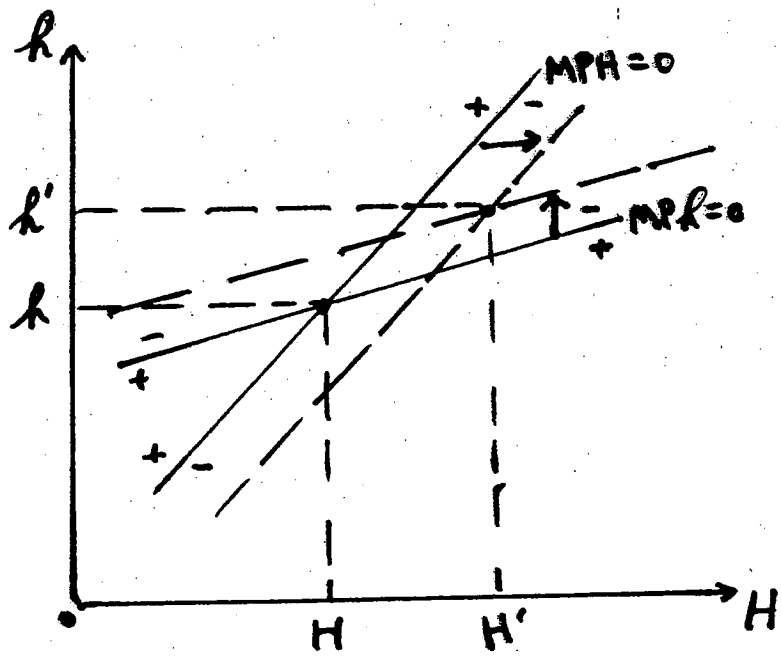
Another way to view these shifts is depicted in the lower graph in Figure 8. In that graph, the two marginal profit functions, $M\pi H$ and $M\pi h$, are set equal to zero and they map all points H and h that give zero. $M\pi H$ is steeper than $M\pi h$ for stability. $M\pi H$ shifts out as a parameter increases and $M\pi h$ shifts up.

In other words, if an increase in the advertising parameter or the RND parameter, or the coordination parameter that originated at Home shifts the MVH curve out, and complementarity exists, then the MVh (or MCh) will also shift out, resulting in size h increasing. As an example, say the Home office learns how to make its advertising more effective, thereby increasing the MVH of internalizing a given set of activities, then the resulting larger H can by the transference of knowledge to the subsidiary, cause, in effect, the MVh to shift out, so in the end both H and h increase.

The complementarity analysis can become very messy, if we consider all four functions

TRANSACTION COSTS AND MNE MODEL (Fig. 8)





$$h/H > \frac{h'}{H'}, \left(\frac{h}{H+h}\right)$$

and all three parameters jointly. A simpler model will be more useful. Let us assume that MCH and Mch are constant and independent (so there is no cross learning) of each other. The focus is then on MVH and MVh with cross learning (See Fig. 9 below).

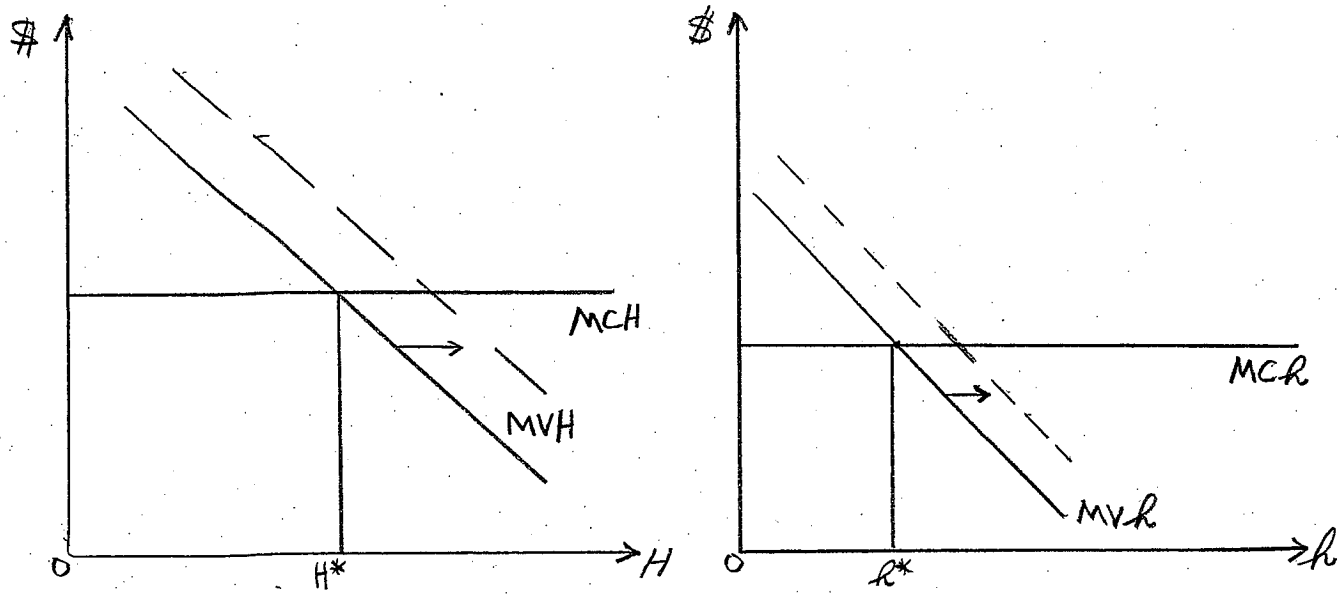


Fig. 9. The Simpler Coase Interaction Model

Now, as before, advertising efficiency originating at the Home office increases, so MVH shifts out and then MVh shifts out. As a result both H* and h* equilibrium values increase.

This is a good time to operationalize our analytic results. Assuming that there is a one-to-one relationship between capital investment and H and h as activity sets, we can derive a measure of the MNE's foreign intensity. The index of foreign intensity is given by

(12) $h/(H + h) = Kf/Kf + Kd = G(\alpha, \beta, \theta)$,

where Kf and Kd are foreign direct investment and domestic investment and G(.) Is the function determining the index.

The shifting of the marginal curves need not be proportional and will be affected by

where the parameter changes originate, Home or host. It is possible, for example, that MacDonald's Hamburger in Thailand will learn of a more efficient way to advertise, so its MVh shifts out by a large amount but the MVH (after the transfer of knowledge) only shifts out by a small amount. Thus, the foreign intensity index will increase.

It is left to the student to work through many more examples using RND and the inter-firm coordination parameters. A word of caution about the inter-firm coordination parameter. If, for example, MacDonald's and Wendy's practice some form of collusion over advertising programs, then, efficiency in advertising may improve, so MVH shifts out for MacDonald's (and for Wendy's) setting in motion the complementarity effect we have been discussing. Thus, rivalry can in a sense result in complementarity.

The other effect mentioned earlier is that of substitutability. Here, an outward shift of MVH increases H*, but this increase has an adverse effect on the MVh of the subsidiary, causing it toshift inward. This is the Hicksian regression effect (1936). Exactly how this effect can occur in the context of the Coase Model is difficult to explain. An increase in H may result in the Home giving less attention to the management of the subsidiary and this action lowers the efficiency of (say) advertising and/or RND programs. The MVh of internalizing more activities falls, so size h falls and the foreign intensity index falls. In any case, our sense of the effect leads us to believe that it is probably not very significant.

Lecture 7, Theory of Market Structure and Competition:

A. Theory of Market Structure

In this lecture, I survey the theory of industrial organization (industrial economics). The basis of the theory consists of the four traditional markets considered in intermediate and

advanced microeconomics: perfect competition, monopoly, monopolistic competition, and oligopoly. I emphasize oligopoly and oligopsony (the input side of the market).

In the context of multinationalism, the key question is: does the growth of FDI increase or decrease competition? Does it result in raising or lowering the concentration of market power?

The answer to these questions depends to some extent on the analytical model or paradigm used and empirical observations. I survey the basic elements of the traditional theory or school of I/O and the recent school of contestable market structure theory.

1.) Traditional Theory of Industrial Organization

The figure below describes the SCP relationships, how structure (S), conduct (C), and performance (P) are related.

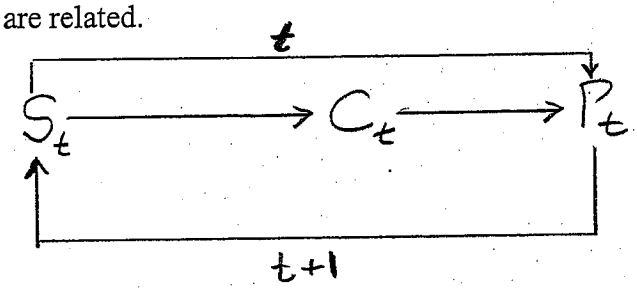


Fig.10. The Traditional Model

The elements of structure are the number and size of buyers and sellers in the market; the concentration ratios–

(i) CR4 = sales of the top four firms/total market sales

(ii) Herfindahl index, $H = S_1^2 + S_2^2 + S_3^2 + \ldots + S_n^2$,

where S_i is market share (%). To illustrate H, let $S_1^2 = (50\%)^2 = 2{,}500$, $S_2^2 = (35\%)^2 = 1{,}400$, and $S_3^2 = (15\%)^2 = 175$, for a total H= 4,075; entry conditions or barriers to the entry of potential rivals–free, degrees of barriers, or blocked; the degree of product differentiation or the nature of

the product; the degree of market opportunity, and the degree of technological opportunity. I will show how to measure these elements later.

The elements of conduct consist of the goals of the firms (profit maximization or utility maximization); the means of inter-seller coordination–how rivals' actions are coordinated–by the invisible hand of the market forces of supply and demand, or the visible hand of perfect collusion, or the quasi visible hand of imperfect collusion; and the methods of decision making–optimization rules or rules of thumb.

The elements of performance consist of the profit rate (on sales, on assets, or on equity); the rate of technological change; the rate of growth of the size of the firm; and price dynamics over time. Also relevant here is the difference between the private rate of return on investment and the social rate of return, where the latter reflects positive and negative externalities (like pollution and worker training).

The empirical model is typified by

(13) $\pi_{ijt} = f(\text{ size}_{ijt}, \text{CR4}_{jt}, \text{K/Q}_{ijt}, \text{Adv/Sales}_{ijt}, \text{RND/Sales}_{ijt}, \%\Delta\text{RND}_{ijt}, \%\Delta\text{Sales}_{ijt}, \ldots)$,

where firm size, as measured by assets, sales, or employment, is used by the Chicago School of Economics to test the market efficiency hypothesis, CR4 is used by the traditional school to test the collusion hypothesis, K/Q is an index of technology (light vs heavy industries), Adv/Sales ration is an index of the degree of product differentiation, RND/Sales measures RND intensity or the degree of product and process innovation, technological opportunity can be indexed by the rate of growth of RND or by a judgment index (low, medium, or high), and market opportunity can be indexed by the rate of growth of Sales or by the rate of growth of the number of buyers of a given product preference or by a judgment index as before.

2. The Chicago School of I/O

The Chicago School of I/O emphasizes the role of the so called free market to explain the existing structure of an industry. In the figured below the direction of causation is changed so that structure is determined by conduct and/or performance. Conduct can include merger and

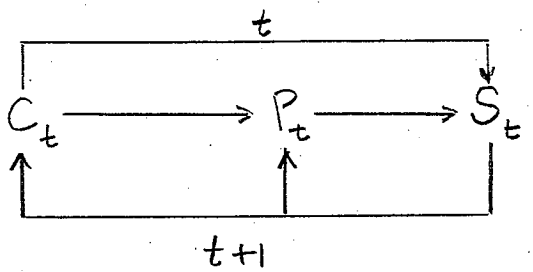


Fig. 11. The Chicago School

acquisition activity which operate directly on structure as given by the Herfindahl index.

3. The Contestable Market Structure Theory

The theory of contestable market structure began with the work of Baumol, Panzer, Willig, and Bailey in 1982. The term contestable is analogous to the term competition or rivalry. They argue that it is a more general theory and that it includes the traditional perfect competition as a special case. It has two forms–perfect contestability and imperfect contestability. In the figure below I describe how S, C, and P are related. Structure is given by S={Q1, Q2, Q3, ... , n,

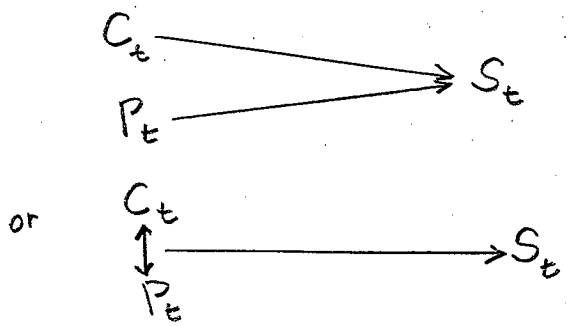


Fig. 12. Contestable Market Theory

P }.

The key assumptions in perfect contestability are (the student should refer to the readings in the syllabus):

1. Entry is free and complete–an entering firm can take over the complete market of an existing firm.

2.. Entry is absolute (not relative) in that there is no time for the existing firm to react to the entry (by, say, lowering its price).

3. Entry is reversible–there are no sunk costs (costs that can only be recovered by staying in business with adequate sales).

The behavioral aspect of the theory is captured by game theory. In the ex ante state, there exist potential entering firms–some will win out and some will lose out, depending on their relative cost structures. It is like "musical chairs," except that the number of chairs is itself unknown until the music stops. All winners are susceptible to "hit-run" entry. If a firm sets its price P > AC (average long-run cost), then profits are positive and entering firms can practice hit-run competition. Since all potential firms know this before hand, they must set P = AC or know that they will lose out. So, all firms set P = AC and only those firms with the lowest cost win out and are in the industry. Thus, the structure gets determined endogenously.

The long-run equilibrium is ssustainable as long as P = > MC and P = AC for n = 1 and for n = > 2, then P = MC = AC. Thus, the traditional perfectly competitive results can be obtained without assuming a large (infinite) number of sellers.

In the figure below we try to capture how conduct (the potential for hit-run) and performance (relative cost structures) determine the structure of the industry and long-run

equilibrium. The firms 1,2,and 3 have too high a cost and ex post lose the "race." Firms 4, 5,

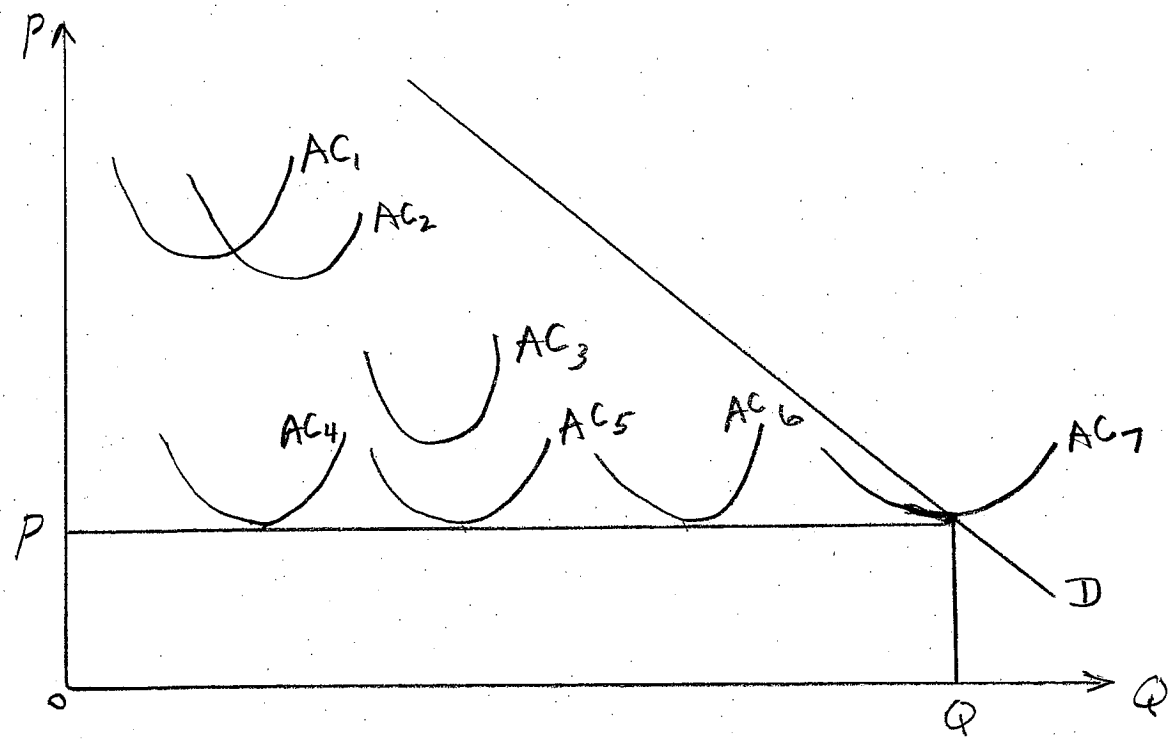


Fig. 13. Contestable Long-Run Equilibrium

6, and 7 tie in cost and become the winners (the AC structures are spread out in sequence to show the total industry output).

In imperfect contestability, there exist barriers to entry so entry is not free, complete, and absolute. The hit-run potential can still operate, but the price is above average cost by the height of the barrier (cost) of entry. So, in long-run equilibrium,

(14) $P = AC + AB = MC + MB$,

where AB is the average barrier cost and MB is the marginal barrier cost.

4. Barriers to Entry and Limit Pricing

Here, we explore how barriers determine a price such that entry is discouraged. As indicated earlier, barriers to the entry of new competition are part of the structural elements.

There are three important sources of barriers to consider here. The essential idea is that the existing price leader (or dominant firm) of the industry makes an estimate ofwhat the unit production cost and selling cost will be for the best potential entering firm and sets his price equal to the total of those unit costs (Bain, 1956 and Scherer and Ross, 1990). So, it is not the existing firm's unit cost that necessarily determines price in limit price theory, but the potential entering firm's unit cost that determines the price set. This determination is a very different proposition compared to the traditional theory of price. Empirically, it means we can no longer infer cost behavior from price behavior or the reverse, price behavior from the cost behavior of the dominant firm. Price is based on what the potential competition's costs are.

A very simple model of limit pricing can be based on the monopoly model. In the figure below, if the monopolist has absolutely no fear (or threat) of entry (due to patents, site location, or legal barriers), then the profit maximization price is P', where MC = MR at Q'. If, however,

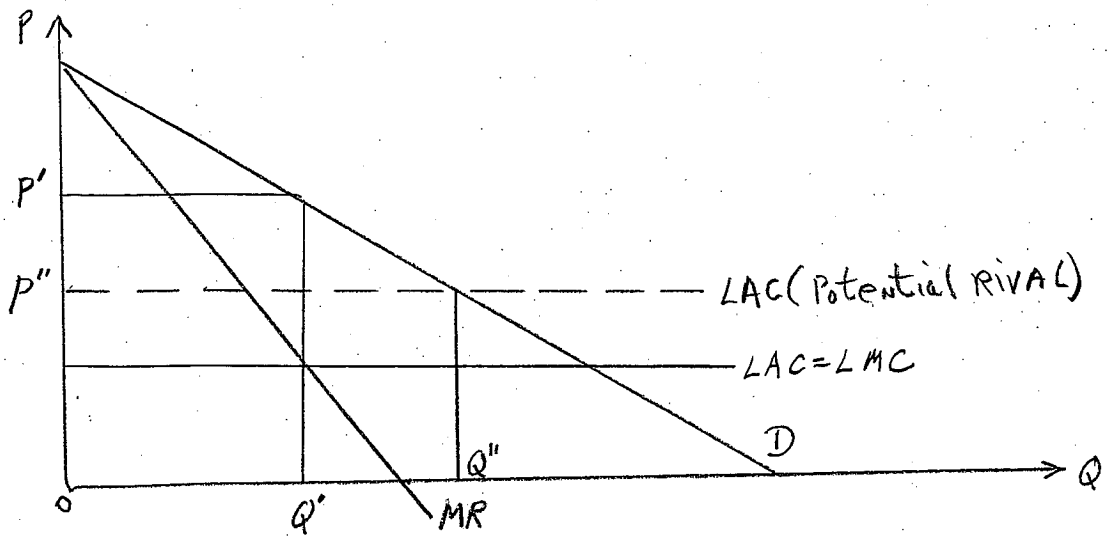


Fig. 14. Monopoly Model and Limit Price

there is a threat of entry from a potential rival, the monopolist will estimate what the rival's cost will be and set his price equal to that estimate at P" and sell Q". How can we be sure that the

rival's cost will be above the monopolist's cost? We can't. But, the assumption that it is above is part of the argument. If it is below, then the monopolist is out of business anyway.

The three sources of barriers that I consider are product differentiation, patent rights, and economies of scale.

(1.) Product Differentiation

In the figure below, I show the market demand curve (D), the dominant firm's demand (or market share)(D_i), and the average cost of production and selling costs for the dominant firm. Notice, the unit cost for the potential entering firm is given by $AC_i + CU$, where we assume that

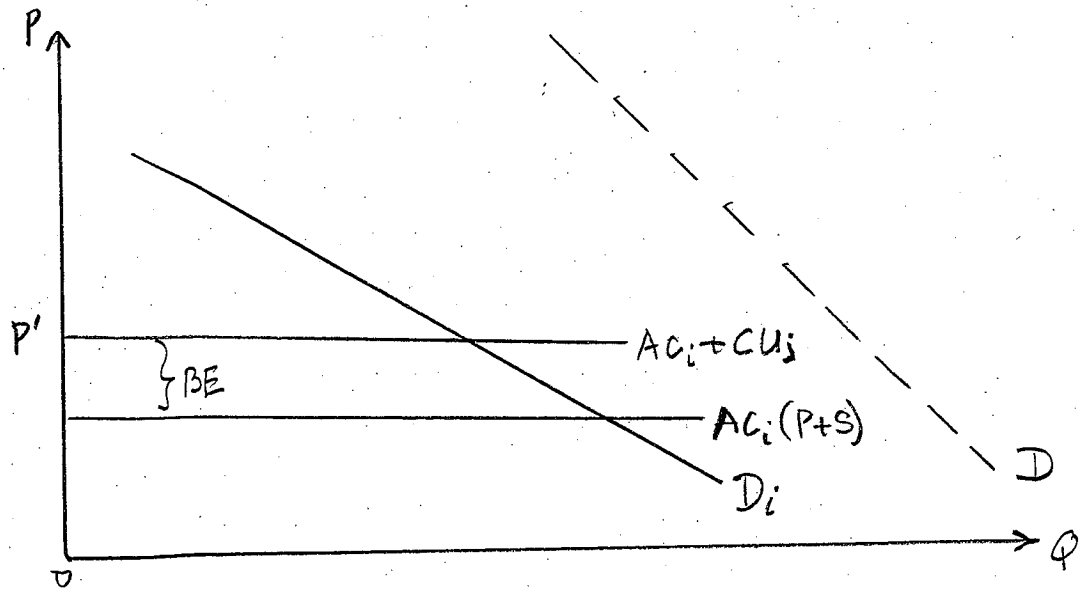


Fig. 15. Product Differentiation and Price

the rival at best has a cost equal to that of the dominant firm and CU_j is the catch up cost needed to quickly get a product that is competitive with that of the dominant firm in design and quality. In other words, the dominant firm must estimate how much additional cost a potential rival must incur, even given that the rival's production and normal selling cost are as low as its own, in order to have a close substitute. The catch up selling cost is over and above a normal selling

cost, one needed to maintain the previous investment in brand-name loyalty. By setting his price equal to ACi + CU, the CU is the barrier to entry for there is no profit incentive to enter.

(2.) Patent Rights

Here, we assume that the firm spends (invests) a given amount of money in RND to complete a product project. This investment is amortized over a given number of years (depending on market and product conditions). For simplicity, we can assume one year. It is further assumed that a potential entering firm would have to spend at least that amount on RND in order to be competitive. Again, the dominant firm estimates what a potential rival's amortization would be and set his price equal to AC + RND (for new firm). The barrier is the estimated unit amortization, RND.

(3.) Economies of Scale

In the figure below, I again show the demand curves for the market (D) and the dominant firm (D_i). The average cost curve (long run) now shows economies of scale. To determine the limit price, shift the dominant firm's demand curve to the left until it is just tangent to the LAC (Modigliani, 1970). The intercept of the demand then determines the limit price, P'. If the

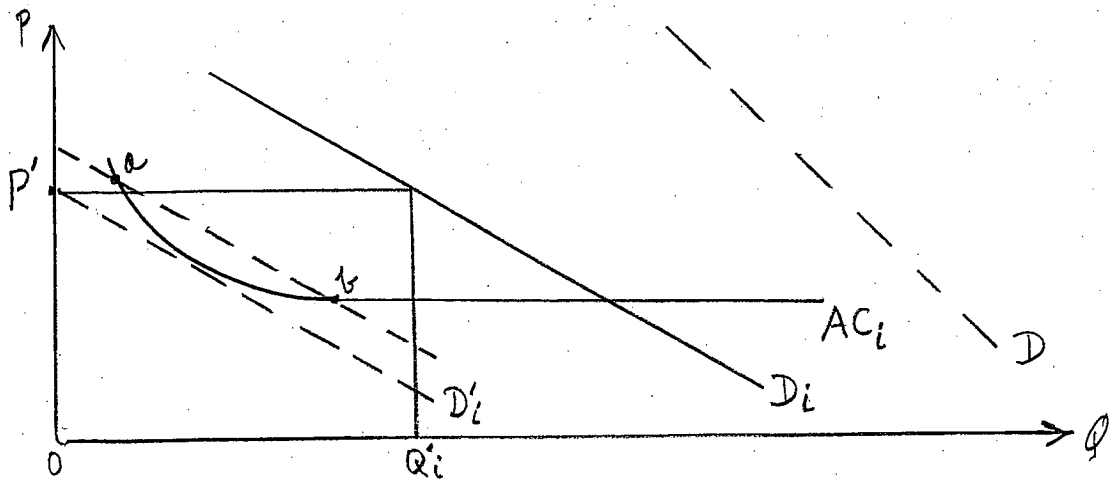


Fig. 16. Economies of Scale and Limit Price

dominant firm sets a price above P', then the potential entering firm with a demand curve like that of the dominant firm could set a lower price but one still above his average cost (in the range a,b) and make a profit upon entering. I use the dominant firm's demand to determine the intercept, because we assume that the potential rival will have a product similar to that of the dominant firm. If the residual market demand curve is used then while the principle is the same the implication is that the entering firm is satisfying the general market, which is a vague concept. So, we assume that the two firms have the same price elasticity of demand.

B. Cournot Oligopoly and Multinationalism

Here, I use the basic Cournot duopoly model to analyze competition between a host country firm (q2) and a MNE (q1). The student should refer to my web page in WWW.econ.utah.edu/gander and study the relevant topics.

To begin, we assume a linear market demand curve, homogeneous products, and constant but not necessarily equal unit costs for the two firms. The two profit functions are given by

(15) $\pi 1 = R1 - C1 = P(Q=q1 + q2)q1 - c1q1 = \pi 1(q1,q2)$

$\pi 2 = R2 - C2 = P(Q=q1 + q2)q2 - c2q2 = \pi 2(q1,q2)$,

where $P(Q) = a - b(q1 + q2)$. The profit maximization rules for each firm given the other firm's output are

(16) $MR1 = MC1 = c1$

$MR2 = MC2 = c2$,

where $MR_i = q_iP'(Q)dQ/dq_i + P(Q) = a - 2bq_i - bq_j$, and dQ/dq_i the conjectural variation equals one. Solving (16) for q1 and q2 gives two linear reaction functions (See, attached Fig. 17)

(17) $q1 = R1(q2) = (a - bq2 - c1)/2b$

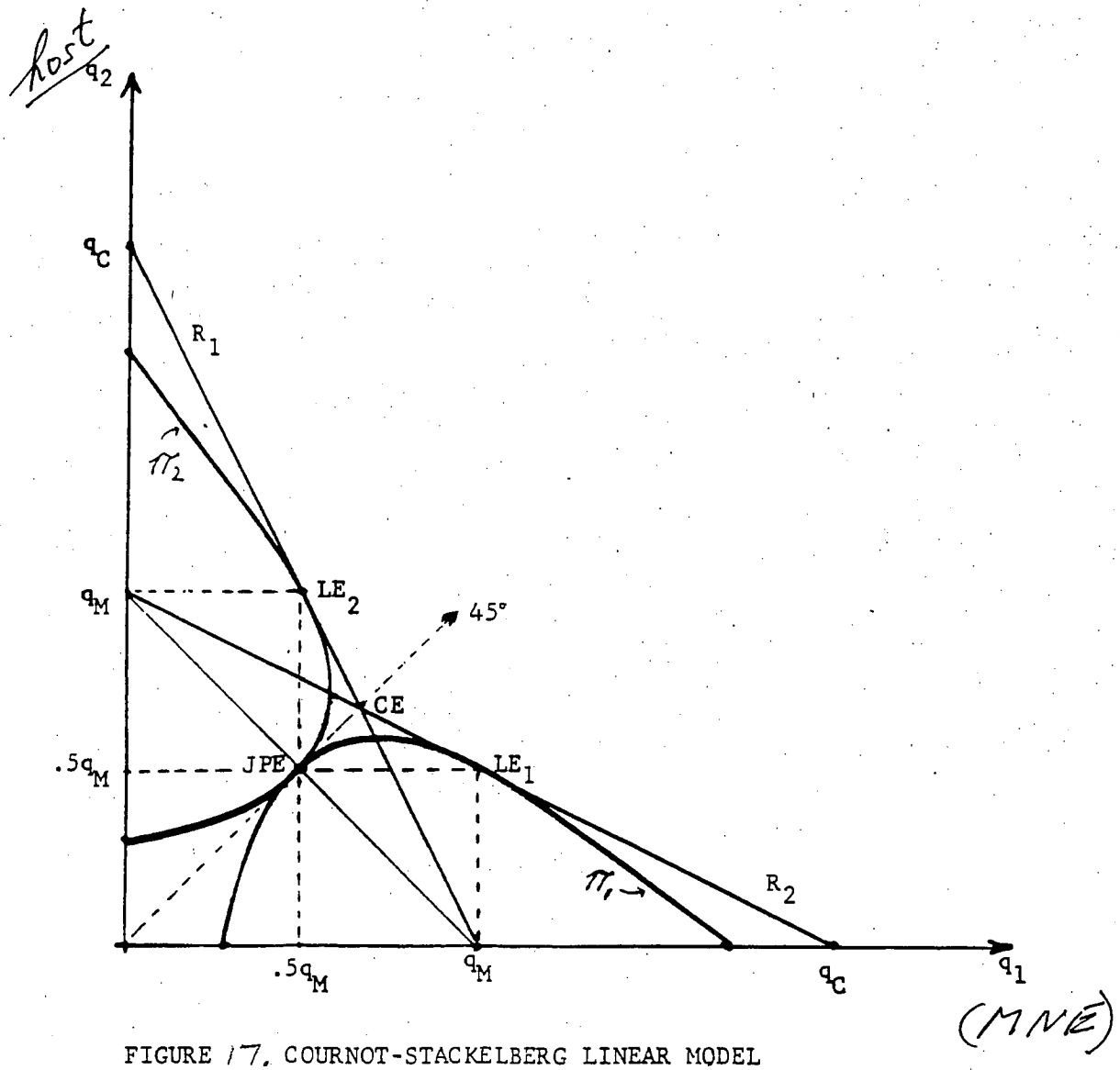


FIGURE 17. COURNOT-STACKELBERG LINEAR MODEL

$q2 = R2(q1) = (a - bq1 - c2)/2b.$

At the intersection of the two functions is the Cournot-Nash (since Nash converted Cournot to an ex ante game in 1950) equilibrium (CE). The cruves in the figure are typical iso-profit curves from (15). These iso-profit curves are used to illustrate other price-quantity solutions (such as, joint profit maximization and collusion at JPE, monopoly at qm, and Stackelberg leadership at LE1 or LE2). We focus on the basic Cournot solution. We want to investigate what happens to FDI (the MNE's foreign investment) when technology changes, the market demand increases, and the products are differentiated.

1. Technology Changes

Let us assume that technology only improves for the MNE. As a result, its c1 falls and R1 function shifts to the right as in the figure below. The new solution is at b, where FDI is

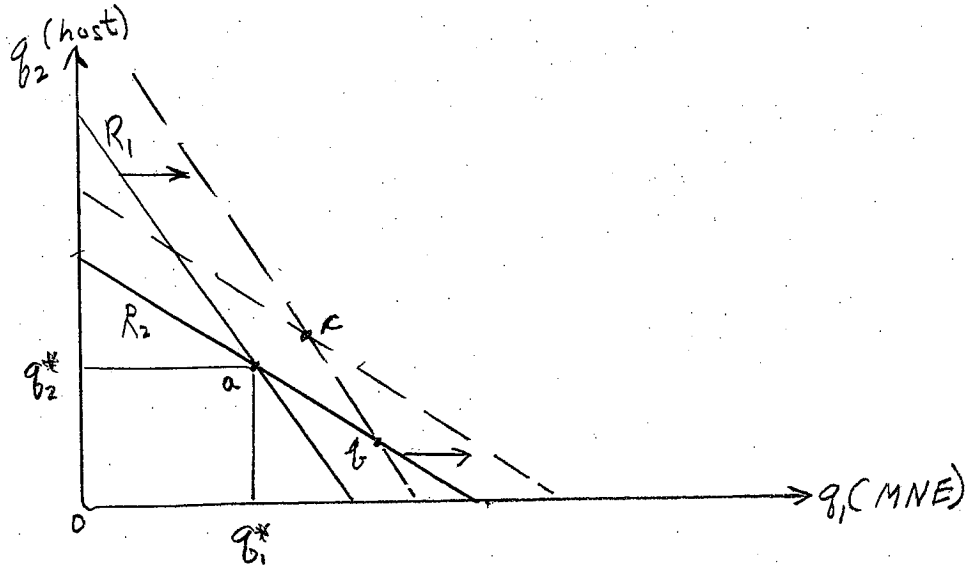


Fig. 18. Cournot and Technology

now larger (it can be greenfield or an acquisition of the host), since its output is larger. The foreign intensity index, FI = K1/(K1 + K2), MNE's capital and the host firm's capital, will have increased.

If technology improves for both firms, then both reaction functions shift out and we get a new solution at point c. Since investment has increased for both firms, a change in foreign intensity will depend on the relative magnitudes of the shifts. These magnitudes will further depend on the relative growth of RND spending, whether $(\Delta RND/RND)1 >< (\Delta RND/RND)2$, and the corresponding effects on technological change and cost reductions, $(\Delta T/T)1 >< (\Delta T/T)2$.

2. Growth in the Market Demand

Here, both firms benefit. The growth in demand is given by the increase in the demand curve's intercept "a" in (15). Both reaction functions shift out proportionally to the new solution at point c. Foreign intensity will be unchanged, although FDI will have increased so has domestic investment.

3. Product Differentiation

With product differentiation, we must split the market in two, so we have two separate but interrelated demand functions as q1 = d1(P1, P2, A1, A2) and q2 = d2(P1, P2, A1, A2), where the A's represent advertising expenditures. The degree of substitution is given by the cross-elasticity of demand

(18) $CR_{ij} = \%\Delta q_i / \%\Delta P_j > 0.$

The two products are usually assumed to be close substitutes, so CR is large and positive. It is also possible to have two oligopolists in a complementary relationship (like gasoline and tires). The CR is then negative.

The derivation of the reaction functions is similar to the quantity model. The profit functions are given by

(19) $\pi 1 = R1 - C1 = (a1 - b1P1 + d1P2)P1 - c1(a1 - b1P1 + d1P2)$

$\pi 2 = R2 - C2 = (a2 - b2P2 + d2P1)P2 - c2(a2 - b2P2 + d2P1)$,

where the "a's" are implicitly functions of the A's, advertising. The profit maximizing rules are given by (CV = dP/dPi = 1)

(20) MR1 = MC1 or $(a1 - 2b1P1 + d1P2) + c1b1 = 0$

MR2 = MC2 or $(a2 - 2b2P2 + d2P1) + c2b2 = 0$.

Solving (20) for P1 and P2 gives the following reaction functions

(21) $P1 = (a1 + d1P2 + c1b1)/2b1 = F1(P2; a1,b1,c1,d1)$

$P2 = (a2 + d2P1 + c2b2)/2b2 = F2(P1; a2,b2,c2,d2)$.

In the figure below, we show the two reaction functions for the substitution case. If

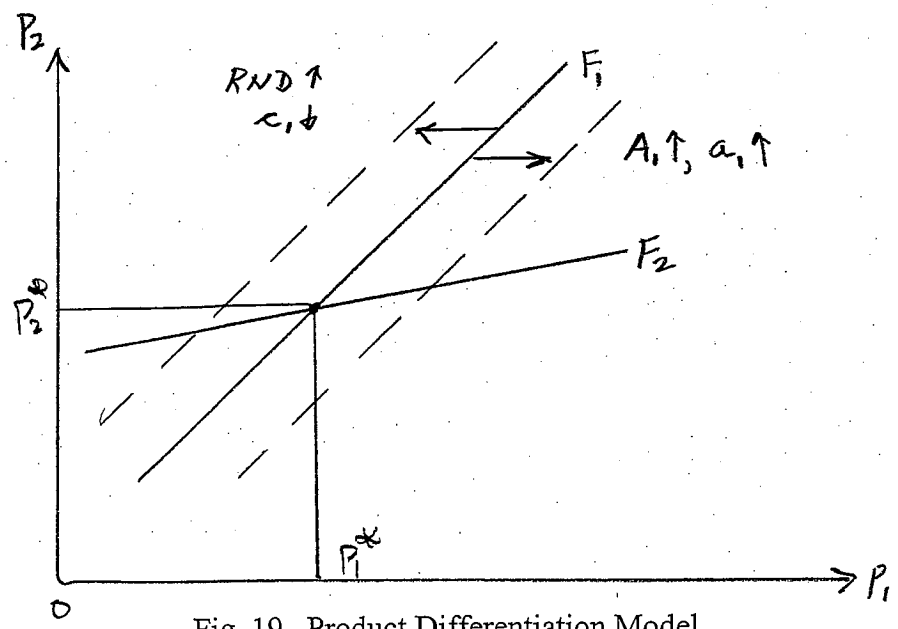


Fig. 19. Product Differentiation Model

technology due to RND improves for firm 1, the F1 function shifts to the left, since marginal cost c1 falls from (21), and both prices fall. (To see this, totally differentiate (20) with respect to c1 (dc1 is negative) and solve for the solutions dP1/dc1 and dP2/dc1)

C. <u>FDI Effect on host Industry Structure</u>

The central question raised by Chapter 4, WIR1997, Reading #7, is: Does the growth of FDI increase or decrease host country industry competition? One might add in light of Contestable Market Theory, what is so great about increasing competition? Economists generally agree that the efficient use of resources requires competition. Then, the question is how much competition. In monopolistic competition, there are too many sellers and over crowdedness occurs. Our focus here is on the host industries and the need for efficient resource allocation.

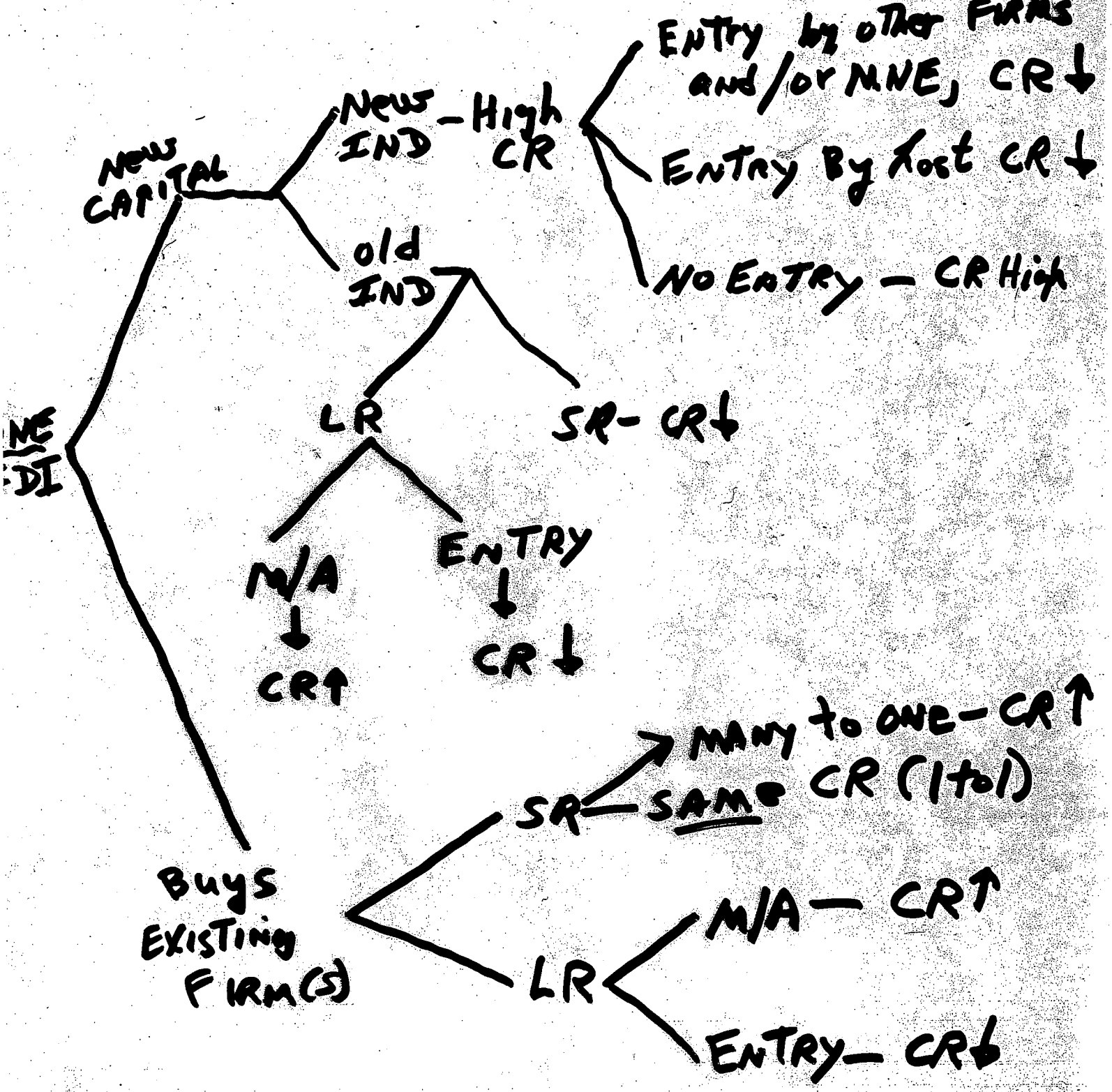
Rather than address the many specific points raised in Chapter 4, I give a schematic picture which summarizes all empirically possible effects on industry structure as measured by the concentration ratio (CR4). See Figure 20 attached. Note that even in the case where FDI represents a change in ownership of capital, new management and/or new technology (technology transfer) may result, so productivity and efficiency may increase. The effect on competition and price and quantity has short-run and long-run characteristics that can give a mixed answer to the central question. In general, Chapter 4 concludes that the effect of FDI on competition can go either way (+ or -), depending on economic and policy conditions.

Z-

Since FDI used for mergers and acquisitions can take any one of three forms: vertical, horizontal, or conglomerate (or diversified), it is useful to examine Zeuthen's model (1939, see my web site). In this model, he shows how vertical and horizontal mergers can affect the structure of the industry and thus the final price of a product. The methodology is based on the concept of successive marginalization (or successive profit mark ups) by sellers in vertical competition. A simple example will be helpful.

Say, the final product is brass. Its production requires the production of copper and zinc,

Fig. 20. FDI EFFECTS ON INDUSTRY STRUCTURE



sold separately by two firms. Let, B = C + Z so that the proportions are fixed and each variable can be measured on a given Q-scale. Let the demand curve for brass be of the Cournot type, 0-1-1 as shown in the figure below. Further assume that the cost of production of copper, zinc, and brass is zero (or equivalently some constant). In a sequence of ex post moves, Cournot trial and error and re-contracting finally leads to an equilibrium. In a Nash ex ante game, only the final equilibrium is observed.

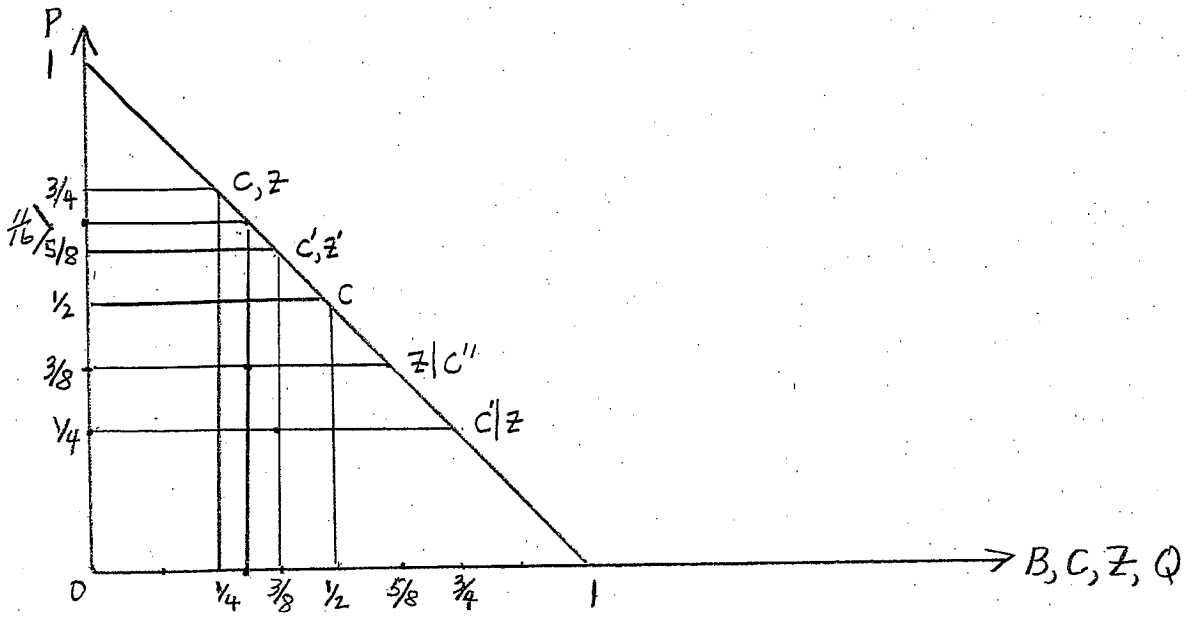


Fig. 21. Zeuthen's Brass Model

To start the sequence, the copper firm sets MR = MC = 0 at C=1/2 and charges the zinc firm P=1/2 (the profit mark up and cost of the input to the zinc firm). The zinc firm now considers the residual demand vertically and sets his MR = MC = 1/2 for a final price of 3/4 and a quantity of brass at 1/4. But, now, the copper firm takes the zinc firm's price 1/4 (3/4 - ½) as given and views his vertical residual above P = 1/4 and sets MR = MC = 1/4 for a combined price of 5/8 and an output of 3/8. The zinc firm in turn takes P=3/8 (the net price or mark up for the copper firm) and sets MR = MC = 3/8 and supplies 5/16 for a combined price of 11/16 (3/8 for

copper and 5/16 for zinc). The sequence finally converges to Pc = Pz = 1/3, price of brass is 2/3, and output of brass is 1/3. The copper firm sells at 1/3 to the zinc firm and the zinc firm sells the brass for 2/3 with a quantity of 1/3.

Zeuthen has a simple formula for this simple model, namely

(22) $P_i = 1/(1 + r)$,

where r is the number of layers of vertical competition, here r = 2. The combined profit is (Pc + Pz)Q = 2/9. A more elaborate formula (See my web site and the attached Figure 22) considers the number of layers and the number of sellers in each layer (n_i , i= 1,2,3,...,r) as in

(23) $P' = [1/n_1 + 1/n_2 + 1/n_3 + \ldots + 1/n_r]/(1 + N) = N/(1 + N)$ and,

$P_i = (1/n_i)/(1 + N)$,

where P' is the combined price or joint profit mark up and P_i is the net price or mark up for the ith layer. So, if layer i has many sellers, its net mark up would be zero (remember, Zeuthen assumes that production cost or value added at each layer is zero, only the mark up for the input passed on is recorded). For the attached Figure 22, we demonstrate several examples using the formula (23).

(1.) Monopoly in layer #1, 3 firms in #2, 5 firms in #3, and 3 firms in #4 gives

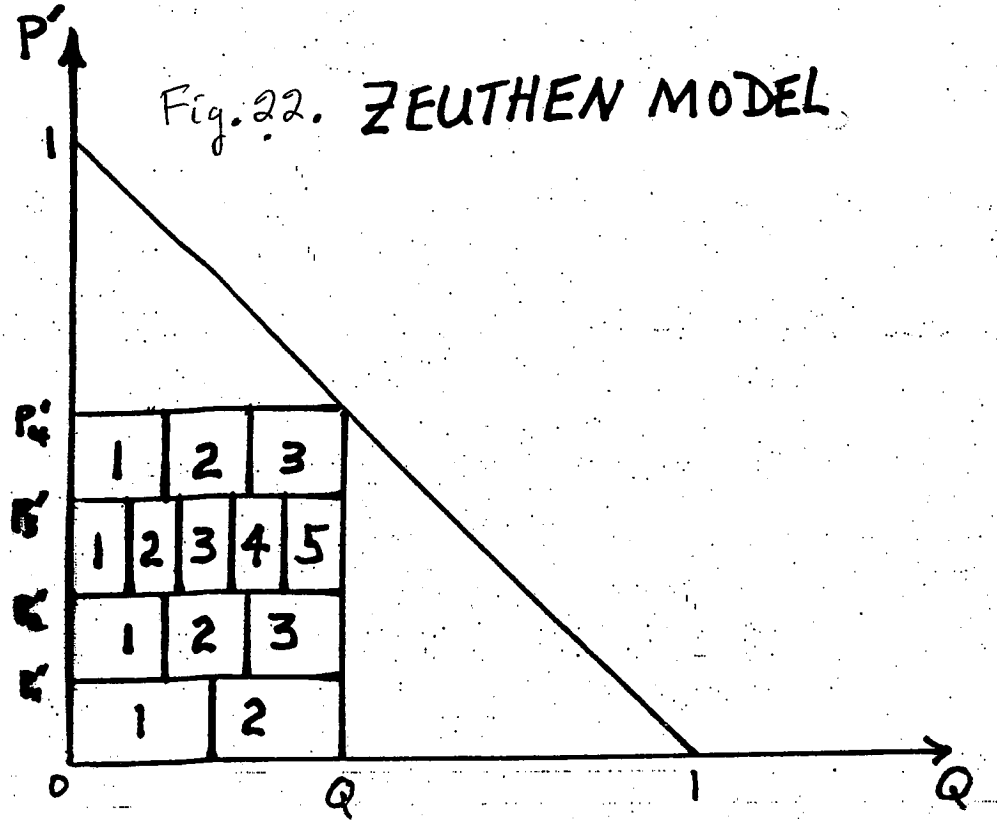
$P' = (1 + 1/3 + 1/5 + 1/3) = 1.83/(1 + 1.83) = .64 > .50$,

where .50 is the monopoly price if one firm buys out all the other firms in all the layers, so P'= 1/(1 + 1) = .50. So, a fully integrated monopolist has a lower price and greater quantity than that for a mixed structure.

(2.) Monopoly in layers #1 and #2, rest the same, gives

$P' = (1 + 1 + 1/5 + 1/3) = 2.53/(1 + 2.53) = .71 > .64$,

Fig. 22. ZEUTHEN MODEL



$\Pi = (P_1' + P_2' + P_3' + P_4')Q = P' \cdot Q$

n = # Layers = 4

m_i = # sellers in i^{th} Layer (2, 3, 5, 3)

$$P' = \frac{\frac{1}{m_1} + \frac{1}{m_2} + \frac{1}{m_3} + \frac{1}{m_4} = N}{1+N} = \frac{41}{71} = .577$$

$$P_i' = \frac{\frac{1}{m_i}}{1+N} = .211, .141, .085, .141 = .577$$

P' is net price (unit margin) over common cost of production (= 0 for Cournot)

$Q = 1 - P'$

a structure that gives an even higher price than before.

(3.) All layers are monopolies, so

$$P' = (1 + 1 + 1 + 1)/(1 + 4) = .80.$$

(4.) If the monopolist in layer #1 buys out the monopolist in layer #2 in example (3.), then with three layers

$$P' = (1 + 1 + 1)/(1 + 3) = .75 < .80,$$

so a vertical merger can reduce the final price.

(5.) If all four layers had perfect competition (large number of sellers), then,

$$P' = (1/\infty + 1/\infty + 1/\infty + 1/\infty)/(1 + 0) = 0,$$

and Q = 1, the best solution. But, short of this ideal market structure, some combinations of vertical and horizontal mergers produce price results that are better than others.

Generally, increasing the number of layers will increase the composite or final price and increasing the number of sellers in any layer will lower the final price. So, how will FDI affect industry structure and competition? There is no set answer. The effect of FDI on competition and P and Q will depend on the mix of vertical and horizontal mergers and acquisitions that emerge from the FDI.

D. FDI and FPEI Linkage

FDI and FPEI (foreign portfolio equity investment, stocks) are related but there is an important distinction between the two forms of foreign investment. In terms of the Home country's balance of payments, (X - M) = FI = (FDI + FPEI). The distinction is over the degree of management control by the Home of the host firm.

(1.) FDI involves complete management control by the Home MNE as a result of

the MNE buying all or nearly all of the assets or stock of the host firm, or the MNE importing plant and equipment from its Home to the host to build a factory (subsidiary), or the MNE's Home office lending to its subsidiary to buy plant and equipment.

(2.) FPEI involves no management control and occurs when a foreign individual as an investor buys a relatively small number of shares of either new stock or old issues on the host stock market, or when foreign firms or foreign banks (MNE's) buy a small number of shares of stock. For practical purposes, buying 20-30 percent of the outstanding stock could give the investor some control. But, legal control needs 51 percent for (1.) FDI.

While the conceptual distinction is clear, measurement is a problem. It is very difficult to separate foreign investment (FI) into its parts. The World Bank, the IMF, and UNCTAD all attempt to do this with only partial success.

There are important indirect effects of FPEI on FDI that need to be recognized. First, a "bull market" in the host stock market, where the prices of stock increase (signaling high expectations of good times), will lower the financial cost of new issues and benefit foreign and domestic investment. Second, FPEI increases financial liquidity and loanable funds and makes more investment possible. Third, the efficiency of financial institutions in terms of fewer non-performing loans (NPL) will improve as the host stock market develops and becomes better organized. Finally, laws and regulations concerning bankruptcy, disclosure, and transparency in business transactions will usually improve as more FPEI activity occurs.

~~Lecture 8, Foreign Investment Determinants~~

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Lecture 8, Foreign Investment Determinants:

There are two ways to conceptualize foreign investment intensity. One way is to measure FDI as a percent of the Home's total investment or as a percent of the host's total investment, at the macro or micro level. The other way, using the extended Coase model, is to take h/(h+H) ratio for the MNE as a function of advertising, research and development, and oligopoly industry

structure.

Empirically, foreign intensity (FI) at the micro level is indexed by the UN as the ratio of foreign sales to total firm sales, foreign assets to total firm assets, or foreign profits to total firm profits. These ratios are the dependent variable (Y) in a regression model where the independent variables (the X's) are as follows:

1. RND/Sales or RND intensity
2. Skill intensity of workers indexed by the ratio of the skilled wage rate to the average wage rate for all level of workers or by the ratio of production workers to managerial workers.
3. Advertisement intensity (Adv/Sales).
4. Economies of scale as the ratio of the lowest output at the minimum unit cost to the actual level of output and economies of scope indexed by the number of products in a given group of products.
5. Firm size (h+H) as total assets.
6. Concentration index, either CR4 or HI, where as CR4 increases, oligopoly interdependency and cooperation increase, there is less investment uncertainty with respect to what rivals are planning, and foreign intensity increases.
7. Capital (plant and equipment) requirements, K/L or K/Q ratios.
8. Natural resource availability--more resources means more foreign investment by the MNE.

See the Reading on these determinants.

Lecture 9, Technology Creation and Transfer:

Economic development is indexed by the rate of growth of real GDP per capita over a sustained period of time (say, ten years). Also, part of the development performance is the distribution of income (percent of households receiving a given percent of the total real GDP for a Lorenz curve or the simple ratio of gross profits to total wages at the micro level by firm and by industrial sectors). For now, I focus on the first index. Economic growth will depend on the rate of growth of capital per worker, the rate of growth of capital and labor, the rate of technological change, entrepreneurship, and government policy (trade, industry, monetary, labor).

It is important to note firmly that the training of workers and technology transfer (TT) go together. When a new technology is introduced by the firm, workers must be trained to use it (either general training but usually specific, formal and informal). The training cost (as high as 10 percent of the wage bill and varying across industries and countries) represents an investment by the firm and may or may not actually improve the stock of human capital.

The creation or production of technical knowledge (K) depends on a production function that represents the firm's RND facilities and is given by $dK/dt = F(RND = Eng + Sci + Equipment)$. The RND can be basic (mostly done by universities), or applied (done by government and firms), or developmental (done mostly by firms). The effect of this knowledge is to improve an existing production process or create a new production process or to improve an existing product or create a new product. Hence, we have the classification of technological change into process or product innovation.

In Schumpeter's model (1961) of the technical change process, invention leads to innovation which then leads to diffusion (or TT). Initially, the industry is highly competitive

with many sellers of similar products (for example, computers). An invention occurs (for example, a biologically based OS for computers) that results in a monopoly. The innovation gets diffused over time and the new industry is now competitive and replaces the old industry. This cycle is called "creative-destruction." So, technological change results in creative-destruction.

For our purposes, we are interested in the effect of the market structure on the rate of technological change and its transfer to the host country. There is a controversy in the economic's literature on this issue. K. Arrow argues that perfect competition gives the highest rate of technological change. On the other end, Schumpeter-Galbraith argue that monopoly provides the highest rate due to its size and profits. My position follows that of Kamien and Schwartz (JEL, 1975), who argue that oligopoly with a CR4 of between 40% and %%%% 55 maximizes the rate of technological change (See the figure below).

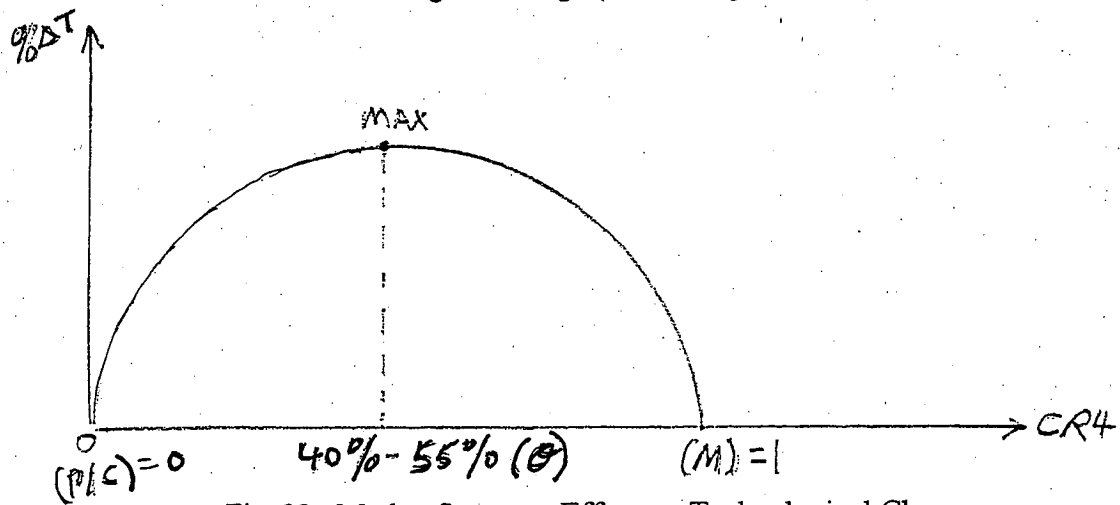


Fig. 22. Market Structure Effect on Technological Change

Another way to analyze technological change is to examine the effect of the pre-technological change market structure on the post-technological change market structure (Kamien and Schwartz, 1990). The pre-technological change or pre-innovation structure can be perfectly competitive, or monopoly, or a Cournot-type oligopoly. The innovation (process type) reduces unit cost (from c to c1) for the innovator and, in effect, gives the innovator a monopoly, potentially. But, whether the innovator can actually realize the monopoly depends on what the pre-innovation structure was.

So, for example, in the figure below, I show a minor innovation where unit cost falls from c to c1 and a major innovation where unit cost falls from c to c2. In the case of a minor

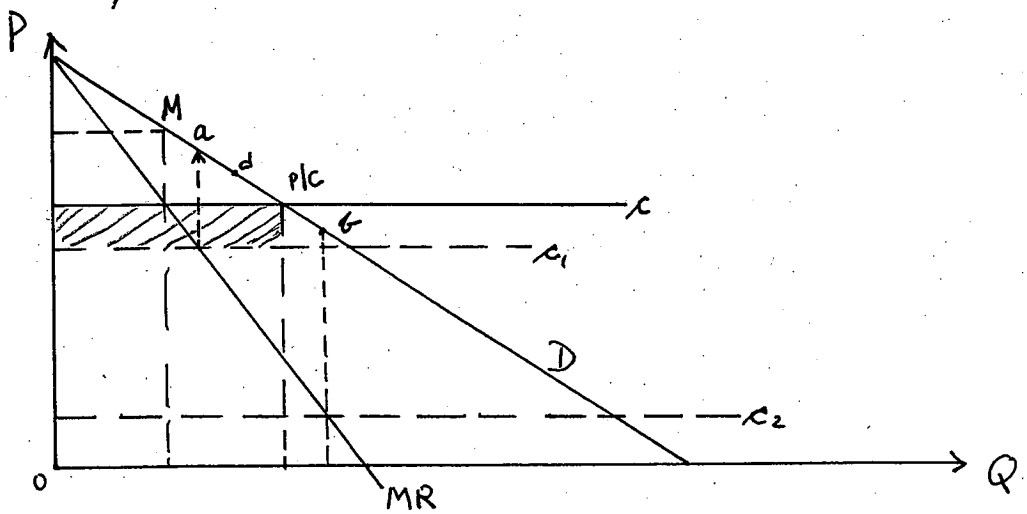


Fig. 23. Market Structure for Pre- and Post-Innovation

innovation, if initially the market structure were perfectly competitive, then price = c. The innovation lowers unit cost but the innovating monopolist would still have a price (point a) above the pre-innovation price, so the monopolist could not put the competitive firms out of business. He can rent the innovation (patent) to the firms, however, and earn a royalty fee equal

to the shaded area in the figure. The pre and post price and quantity are unchanged by the innovation but there is still a reward for innovating.

If, on the other hand, the pre-structure were a monopoly, then the post-innovation price would fall to point a, the innovation is now classified as major and the price and quantity changes.

If the pre-innovation structure were a Cournot-type oligopoly where the price initially was at point d, then, like under the perfectly competitive case, the innovator would not be able to undersell the firms but would end up renting his innovation to the firms.

If the innovation were major to begin with, the low unit cost c2 would give the innovator a monopoly at a price given by point b, which would put all the firms out of business regardless of the pre-innovation structure. The innovator may not choose to go into business, so he could rent the innovation to the existing firms for a fixed fee plus a royalty fee.

So, the effect of a given innovation on price and quantity will depend on its degree (major or minor) and on the pre-innovation market structure.

The final topic in this lecture looks at the relationship between technological transfer (TT) and the host government's expenditure on education (See my web site here for more detail). We are only concerned with TT between the Home and the host. Remember, as indicated earlier, TT and host-worker training must go together. The type of training can be general (so human capital will increase) or specific to the firm and/or industry. It can be formal (classroom) or informal (on-the-job). For now I do not distinguish among these types of training and simply

talk about training in general. The training will cost the firm but labor productivity and real wages will increase. I now present a simple game-type model.

Assume that the profit function for the MNE's subsidiary in a host country is given by

(24) $B = R(T, E) - C(T, E) - T,$

where R is revenue which depends on T (training cost) and E (government expenditure on education–all levels through high school) and C is production cost. Implicitly, I assume that labor and capital are given and fixed. Production cost rises as the real wage rate rises due to the higher productivity from training. I assume further technical complementarity in cost so the effectiveness of T on C depends positively on E. Revenue is increased with T for output is higher with the increase in productivity and E augments the revenue process. For simplicity I assume the product price is fixed. The profit maximizing rule is given by

(25) $MB = MRT(T, E) - MC(T, E) - 1 = 0.$

In the figure below, I show this rule. The net curve is the vertical difference between MRT and

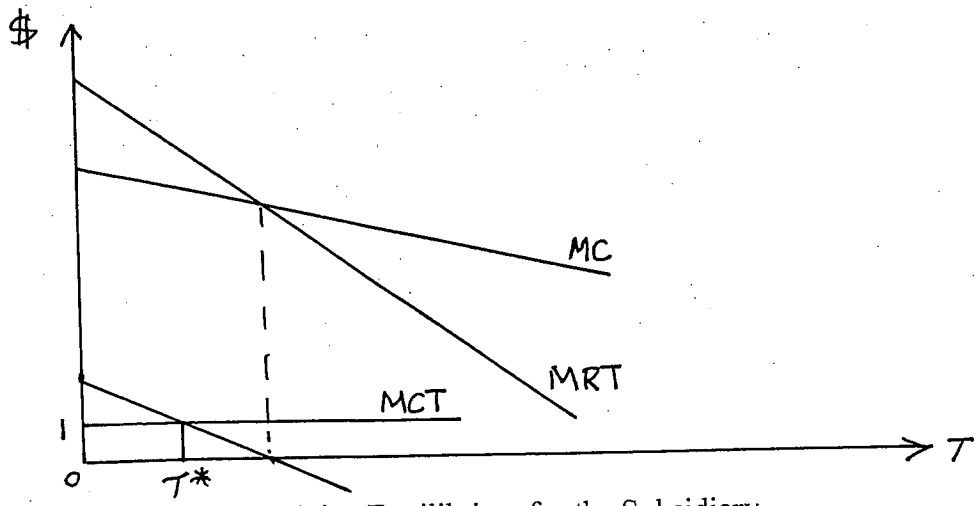


Fig. 24. Training Equilibrium for the Subsidiary

MC. Implicitly, the equilibrium T* is a function of E, so we have a reaction function, $T^* = F(E)$.

The net social benefits function for the host government relevant to a given firm or industry (within a given school district) is given by

(26) $S = tC(T, E) - E,$

where the gross benefits to society tC(.) are based on labor and other factor incomes earned in the local area and t is the tax rate. The government increases education expenditures on local education until S is maximized.

The process can work like this. As E increases, the real wage rate increases for a given T, because workers are better able to absorb the training (I ignore the time lag here but introducing it would not alter the principle–only affect it by a constant). As workers' income rises (the C represents the income), tax revenue rises but so does E. The equilibrium is given by

(27) $MCE(T, E) - 1 = 0,$

and shown graphically in the figure below. Thus, equilibrium E* depends on T, so we have

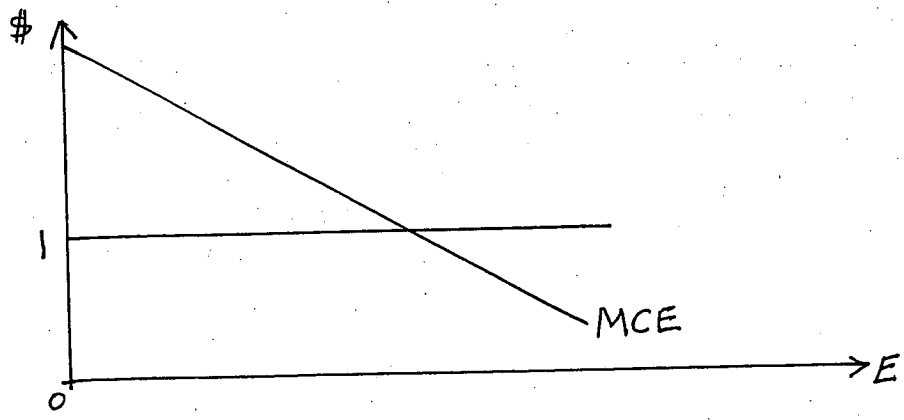


Fig. 25. Education Equilibrium

a reaction function, $E^* = G(T)$.

Both reaction functions are shown in the figure below, where G is steeper than

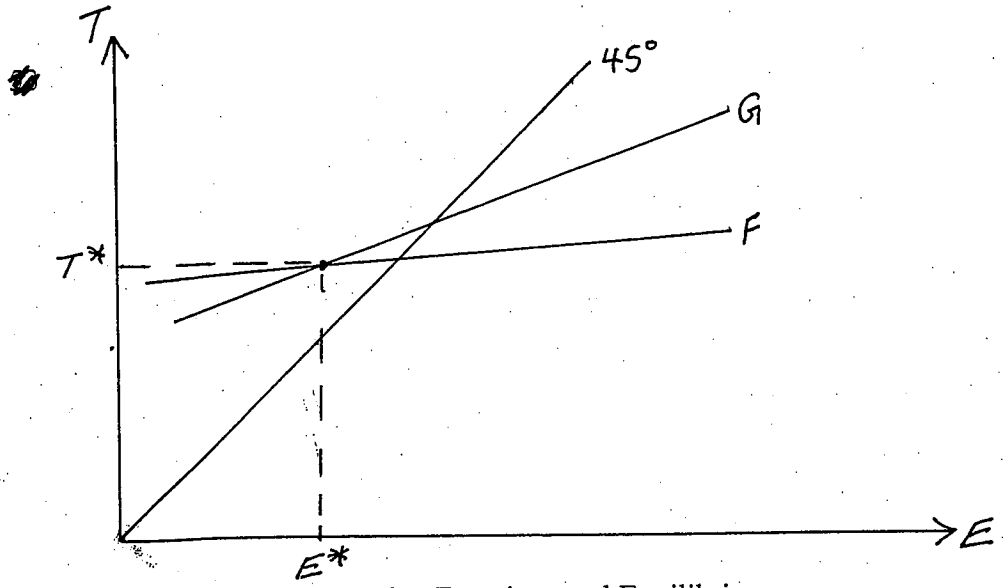
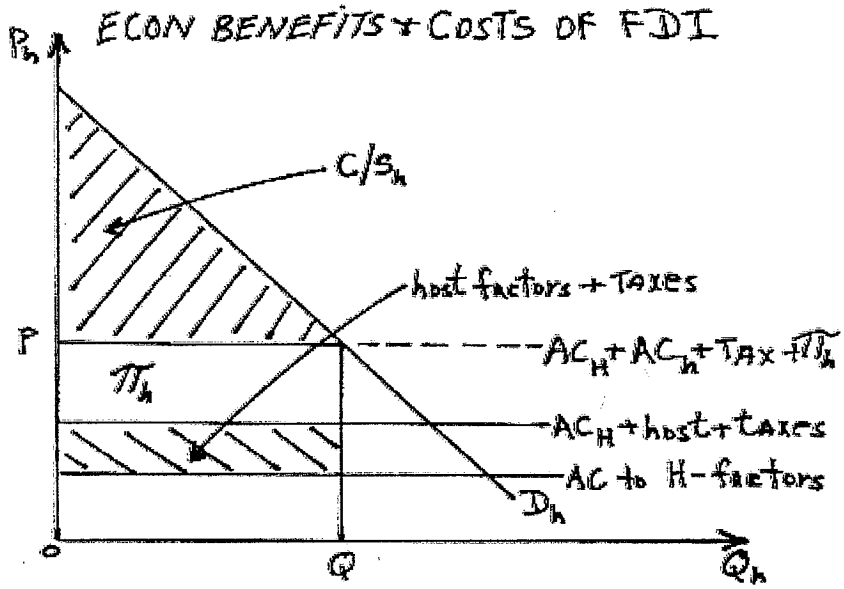


Fig. 26. Reaction Functions and Equilibrium

F for the stability of the game. The game is complementary, since if G shifts out, both T* and E* increase. The 45 degree line in the figure shows the relative burden given by the ratio T*/E* <> 1.

Lecture 10, Cost-Benefit Analysis of FDI and Multinationalism:



$NB = B(FDI) - C(FDI)$

$B = AC_h + taxes + \pi(?) - Opport\ Costs$
$+ NET\ externalities\ (\pm) + C/S$

$C = AC_H$