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FOREIGN MANAGEMENT, INTERNATIONAL CAPITAL, AND INCOME REDISTRIBUTION

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This paper examines the impact of foreign management as a separate input in a competitive economy open to both international trade and international movement of productive capital. Three inputs (capital, labor, management) are used to produce two final goods in a model characterized by competition, homogeneous products, and full employment. This model provides a simple starting point for the study of multinational firm activity, building on the fundamental competitive factor proportions model of production and trade. A clear distinction arises between international movements of capital and management, and international movements of the two inputs are linked. [F 11, F 23]

1. INTRODUCTION

As nations become more integrated economically, multinational firms are becoming increasingly active and important. When a multinational firm expands its operation into a host country, two distinct productive forces are set loose: foreign management and international capital. Most branches of US multinational firms are majority owned, which suggests that US management and capital go abroad together. Allowing an explicit role for management as a primary productive input along with capital and labor leads to the simple model of production with foreign management and foreign investment playing potential roles.

Data on foreign direct investment may serve as a gauge of the degree of multinational firm activity. Foreign management often accompanies international investment. Managers themselves need not migrate, only their management activity. Branch operations are typically managed at some level from the source country. A firm considering a foreign investment project will proceed only if the branch operation can be managed effectively. Management and capital, both seeking a higher return, tend to move together internationally. Conditions which attract foreign capital also attract foreign management.

Ruffin and Rassekh (1986) conclude that foreign portfolio investment and foreign direct investment are empirically perfect substitutes. Distribution of the ownership of publicly held firms is an issue distinct from the pattern of multinational firm activity. The US is an international source of management in construction, finance,

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telecommunications, and other business services. At least a quarter of the stock of US foreign direct investment is in the business service industry, which is intensive in skilled labor (management) input.

Current theories of multinational firm activity are built on departures from the competitive paradigm. Kindleberger (1969), Caves (1971), Krugman (1979), Helpman and Krugman (1985), and others hypothesize that foreign investment arises only in the face of capital market imperfections, fixed costs, differentiated goods, monopolistic competition, oligopoly, or other imperfectly competitive settings. Free trade in finished goods is generally seen as leading to factor price equalization (FPE) between competitive trading partners, eliminating incentive for international movement of productive factors.

FPE occurs, however, only when the number of exogenous prices (international markets) is equal to the number of productive inputs (endogenous prices) as noted by Samuelson (1953-4) and explicitly developed by Ethier and Svensson (1986). If such a situation is the exception rather than the rule, incentive for international factor movement would generally arise even with free trade in a competitive long run equilibrium.

In the present paper, management is included along with capital and labor as a primary factor of production. The movement of management across national borders is considered to be multinational firm activity. The hypothesized economy is perfectly competitive, producing two homogeneous final goods with full employment. Capital is treated in Section 2 below as internationally immobile, and in Section 3 as perfectly mobile. The domestic payment to management is affected by changes in the prices of the two goods, supplies of labor or management, and capital market conditions.

Outputs of the two final goods and returns to management, capital, and labor in both the source and host countries respond to the international movement of management. Productivity of host country labor rises with incoming foreign management, and neglected source country labor suffers. In the model with internationally mobile capital, an endogenous inflow of productive capital accompanies incoming foreign management.

The competitive model of this paper creates a clear distinction while forging a link between the international movements of management and capital. Foreign management is generally associated with branch operations of multinational firms. International movement of productive capital, reflected by data on foreign investment, is theoretically distinct from but generally associated with multinational activity. Any potential confusion between foreign investment and foreign management is eliminated when management is separated as an explicit productive input.

2. THE THREE FACTOR ECONOMY WITH DOMESTIC CAPITAL, LABOR, AND MANAGEMENT

Management (M) is conceptualized as a homogeneous primary input along with capital (K) and labor (L) in the production of goods 1 and 2. Firms combine inputs in a cost minimizing fashion, facing factor payments r, m, and w to inputs K, M, and L respectively. Assume there are homothetic neoclassical production functions with constant returns to scale. Each input is fully employed, moving freely to equalize its return across sectors. The small open economy is a price taker in international markets for the two goods, making those two prices exogenous. Factor prices and outputs adjust endogenously to changes in endowments of the three factors and prices of the two goods.

The basic general equilibrium model of production and trade is developed by a number of authors, notably Jones (1965) and Chang (1979). The three factor production structure has been studied by Ruffin (1981), Takayama (1982), Jones and Easton (1983), and Thompson (1985). The focus in this section is on the domestic income redistribution among productive factors due to incoming foreign management. Endowments of all three domestic inputs are exogenously given. International movement of management is treated as an exogenous endowment change in the economy under consideration. When foreign management enters an economy, it implicitly organizes multinational branch firm operations.

Full employment and competitive pricing lead to the system

$$\begin{bmatrix} S & A \\ A' & 0 \end{bmatrix} \begin{bmatrix} dw \\ dx \end{bmatrix} = \begin{bmatrix} dv \\ dp^* \end{bmatrix}, \tag{1}$$

where S is the 3x3 symmetric matrix of aggregate factor price partial derivatives and A is the 3x2 matrix of unit factor inputs. The system (1) is developed in the Appendix. Vectors of changes in factor prices, outputs, endowments, and prices are respectively dw, dx, dv, and dp^*.

Factor intensity plays the crucial role in determining the model's qualitative outcomes when the three factors are substitutes. The following factor intensity condition is postulated:

$$a_{K1} / a_{K2} > a_{M1} / a_{M2} > a_{L1} / a_{L2}. \tag{2}$$

Capital is the most intensive (extreme) input in sector 1, while labor is the extreme input in sector 2. Assume further that management is closer to labor than to capital in (2). This exact factor intensity is uncovered by Thompson and Clark (1983) in the US with inputs of capital, labor, and skilled labor. Managers are the major category of skilled labor. Similar factor intensities in a number of developing economies are described by Clark and and Thompson (1990).

The algebraic solution to (1) is developed the Appendix. The array of qualitative

comparative static effects is presented in Table 1. Note that the transformation surface $\partial x/\partial p^*$ is locally concave to the origin. Since the system is symmetric, results are reciprocal (symmetric across the main diagonal).

Table 1. Comparative Static Signs with Domestic Capital

	∂r	∂m	∂w	∂x_1	∂x_2
∂K	−	+	−	+	−
∂M	+	−	+	−	+
∂L	−	+	−	−	+
∂p_1^*	+	−	−	+	−
∂p_2^*	−	+	+	−	+

If relatively high factor endowments are associated with relatively low factor prices in autarky, a country with relatively abundant (cheap) management would tend to be an international source of management. Relatively high endowments of labor or capital would generally be associated with relatively high returns to management. The autarky return to management in labor abundant developing countries might be expected to be higher than in developed economies, making developing countries natural hosts for foreign management.

An inflow of foreign management can be interpreted in the model as an increase in the endowment M. Such an increase in the supply or endowment of M would lower its local return in the host country, while wages, the return to capital, and national income all rise. If management is closer to labor in its input characteristics as assumed, output of sector 2 in the host country would rise as resources are shifted away from production of the capital intensive good. A higher price for good 2 or a lower price for good 1 (due perhaps to subsidies or tariffs) would shift resources toward the production of good 2 and increase the domestic demand for (and return to) management. This analysis assumes that management is an internationally homogeneous input. Management is a type of skilled labor with a certain type of human capital. Some management can be done "at arm's length" from the source country. if managers themselves migrate, they must be comfortable in the language and culture of the host. Local workers can be trained in the source country's management technique and employed by multinational branch operations in the host. Some mixture of these activities is envisioned when foreign management enters a host country.

In the three factor, two good model, changing factor endowments are known to affect factor payments in a qualitative fashion determined by the factor intensity ranking. The extreme factors K and L in the intensity ranking (2) are factor "enemies." There is a negative relation between one's endowment and the other's payment: $\partial w/\partial K = \partial r/\partial L < 0$. The middle factor (M) is a "friend" with both extreme factors: $\partial r/\partial M = \partial m/\partial K > 0$ and $\partial w/\partial M = \partial m/\partial L > 0$. This sign pattern holds regardless of the

strength of factor intensity or the pattern of factor substitution or complementarity.

Output effects follow a pattern suggested by factor intensity. When the endowment of M increases with incoming foreign management, it is paradoxical that the return to K rises even as output of the good which uses capital most intensively falls. The added management raises the productivity of both domestic capital and domestic labor. Production shifts toward the labor intensive good, as the payment to labor rises.

3. THE MODEL WITH INTERNATIONALLY MOBILE CAPITAL

An economy which depends on the rest of the world for its productive capital can be modeled as facing perfectly elastic capital supply at the world price r^*. The domestic demand for capital then determines the level of capital employment K_E. In the model of this section, there are three international markets (one for each good and one for capital). There are also three productive factors, which leads to FPE between trading partners. International movement of management is still treated as an exogenous event which the model makes no effort to explain. Changes in the endowment of management create income redistribution and in the present section induce endogenous international movement of capital.

The algebra of this model is also presented in the Appendix. Management is assumed to be the middle factor as in factor intensity condition (2), and all inputs are assumed to be substitutes. The comparative static sign pattern of partial derivatives is presented in Table 2. FPE is reflected by the zeros: $\partial m/\partial M = \partial m/\partial L = \partial w/\partial M = \partial w/\partial L = 0$. Similar countries in free trade would experience equal payments to their two domestic inputs (management and labor).

Table 2. Comparative Static Signs with International Capital

	∂K_E	∂m	∂w	∂x_1	∂x_2
∂r^*	−	−	−	−	−
∂M	+	0	0	+	−
∂L	+	0	0	−	+
∂p_2^*	+	+	−	+	−
∂p_1^*	+	−	+	−	+

Stolper-Samuelson type results hold for the two domestic factors. Payments to management and labor are positively related with the price of the good using either input intensively. Protection of the import competing industry would raise payment to the domestic input used intensively in that sector. If a tariff is levied on imported good 1, output of good 1 increases and capital is attracted to the economy. Management, used intensively relative to labor in sector 1, enjoys a rising payment with the tariff, while output in sector 2 and the wage of labor fall.

Rybczynski type results similarly hold for the two domestic factors. Output of a

good is positively related with the endowment of the domestic factor it uses intensively. Incoming foreign management would spur production of good 1, while output in sector 2 would decline. An *endogenous* inflow of capital is created by an increase in capital's productivity due to the incoming foreign management. An increase in foreign management endogenously brings international capital along with it.

International movements of management and capital are explicitly linked as they were implicitly linked in the model with domestic capital. Since neither the payment to management nor the wage of labor are directly affected by incoming foreign management, shifts in factor demands between sectors must be exactly offset by shifting factor supplies. A lower world price of capital would cause its employment in the economy to rise, increasing the productivities of domestic labor and management. The resulting higher domestic payment to management would make the country a more likely host for foreign management. Again, capital and management would tend to move together internationally. Outputs of both goods would rise with incoming capital.

4. CONCLUSION

The competitive general equilibrium model in this paper begins to address the important but neglected issue of income redistribution resluting from foreign management. While national income increases with incoming foreign management, the distribution of income will be affected. This issue is especially relevant for developing countries, which have low wages and may be natural hosts for foreign management. In detailed or applied models, labor can be split into skill groups or classified as urban versus subsistence. Capital can also be treated as specific to its sector. Factor shares and industries shares, which form the basis of the model in elasticity form, can generally be calculated from national income data. The present model presents a framework for analyzing foreign management and foreign investment in the context of a competitive economy.

Summarizing the effects on income redistribution, incoming foreign management cannot hurt domestic capital owners and labor, but cannot help domestic management. This proposition can be empirically tested.

APPENDIX

The cost minimizing amount of factor i used to produce one unit of good j is written a_{ij}. Aggregate substitution between factors h and k across the economy is summarized by the aggregate factor price partial derivative $s_{hk} \equiv \sum_j x_j(\partial a_{hj} / \partial w_k)$, where x_j represents the output of good j and w_k the price of factor k. When factors h and k are substitutes, $s_{hk} > 0$. When they are complements, $s_{hk} < 0$. Note that $s_{hh} < 0$ by Shepard's lemma and concavity of the cost function. By homogeneity, $\sum_i w_i s_{hi} = 0$. If

factors are rescaled so each factor price is 1, then $\sum_i s_{hi} = 0$.

Full employment of each factor is stated $\sum_j a_{hj} x_j = v_h$. Differentiation leads to $\sum_j s_{hi} dw_i + \sum_j a_{hj} dx_j = dv_h$ and the first 3 equations in (1A) below. Competitive pricing of each good is written $\sum_j a_{ij} w_i = p_j^*$. Differentiation and the cost minimization envelope result lead to $\sum_i a_{ij} dw_i = dp_j^*$ and the last 2 equations (1A). The complete model with domestic capital from Section 2 is written:

$$\begin{bmatrix} s_{KK} & s_{KM} & s_{KL} & a_{K1} & a_{K2} \\ s_{KM} & s_{MM} & s_{ML} & a_{M1} & a_{M2} \\ s_{KL} & s_{ML} & s_{LL} & a_{L1} & a_{L2} \\ a_{K1} & a_{M1} & a_{L1} & 0 & 0 \\ a_{K2} & a_{M2} & a_{L2} & 0 & 0 \end{bmatrix} \begin{bmatrix} dr \\ dm \\ dw \\ dx_1 \\ dx_2 \end{bmatrix} = \begin{bmatrix} dK \\ dM \\ dL \\ dp_1^* \\ dp_2^* \end{bmatrix}. \qquad (1A)$$

The following notation is used: $b_1 \equiv a_{K1}a_{M2} - a_{M1}a_{K2}, b_2 \equiv a_{M1}a_{L2} - a_{L1}a_{M2}, b_3 \equiv a_{K1}a_{L2} - a_{L1}a_{K2}, c_1 \equiv b_2 + b_3,\ c_2 \equiv b_1 - b_2, c_3 \equiv b_1 + b_3, d_1 \equiv c_1 s_{KM}, d_2 \equiv c_2 s_{KL},$ and $d_3 \equiv c_3 s_{ML}$. All of these terms are positive because of the assumed factor intensity and technical substitution. With management closer to labor than capital in the factor intensity ranking, c_2 and d_2 are positive. The determinant D of the system (1A) is negative: $D = -c_1 d_1 - c_2 d_2 - c_3 d_3 < 0$. Comparative static results are found with Cramer's rule. A few results, corresponding to Table 1, are left for the reader:

$$\partial r / \partial K = b_2^2 / D < 0,$$

$$\partial m / \partial M = b_3^2 / D < 0,$$

$$\partial m / \partial K = \partial r / \partial M = -b_2 b_3 / D > 0,$$

$$\partial w / \partial K = \partial r / \partial L = b_1 b_2 / D < 0,$$

$$\partial x_1 / \partial K = \partial r / \partial p_1^* = \left[-a_{L2} d_1 - a_{M2} d_2 - (a_{M2} + a_{L2}) d_3\right] / D > 0,$$

$$\partial x_1 / \partial M = \partial m / \partial p_1^* = \left[-a_{L2} d_1 + (a_{K2} + a_{L2}) d_2 + a_{K2} d_3\right] / D < 0,$$

. . . .

Writing out the model with internationally mobile capital from Section 3:

$$\begin{bmatrix} -1 & s_{KM} & s_{KL} & a_{K1} & a_{K2} \\ 0 & s_{MM} & s_{ML} & a_{M1} & a_{M2} \\ 0 & s_{ML} & s_{LL} & a_{L1} & a_{L2} \end{bmatrix} \begin{bmatrix} dK_E \\ dm \\ dw \\ dx_1 \\ dx_2 \end{bmatrix} = \begin{bmatrix} -s_{KK} dr^* \\ dm - s_{KM} dr^* \\ dL - s_{KL} dr^* \end{bmatrix} \qquad (2A)$$

$$\begin{bmatrix} 0 & a_{M1} & a_{L1} & 0 & 0 \\ 0 & a_{M2} & a_{L2} & 0 & 0 \end{bmatrix} \begin{bmatrix} dx_1 \\ dx_2 \end{bmatrix} \begin{bmatrix} dp_1^* - a_{K1}dr^* \\ dp_2^* - a_{K2}dr^* \end{bmatrix}$$

This system (2A) has a negative determinant: $D' = -b_2^2$. Comparative static results in this model, corresponding to Table 2, are:

$$\partial K_E / \partial r^* = -D / D' < 0,$$

$$\partial m / \partial r^* = -\partial K_E / \partial M = b_2 b_3 / D' < 0,$$

$$\partial w / \partial r^* = -\partial K_E / \partial L = b_1 b_2 / D' < 0,$$

$$\partial x_1 / \partial r^* = -\partial K_E / \partial p_1^* = \left[a_{L2} c_1 s_{KM} + a_{M2} c_2 s_{KL} + (a_{M2} + a_{L2}) c_3 s_{ML} \right] / D' < 0,$$

$$\partial x_1 / \partial M = \partial m / \partial p_1^* = -a_{L2} b_2 / D' > 0,$$

$$\partial x_1 / \partial L = \partial w / \partial p_1^* = a_{M2} b_2 / D' < 0,$$

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REFERENCES

Caves, Richard, "International Corporations: The Industrial Economics of Foreign Investment," Economica, February 1971, 1-27.

Chang, Winston, "Some Theorems of Trade and General Equilibrium with Many Goods and Factors," *Econometrica*, May 1979, 709-726.

Clark, Don, and Thompson, Henry, "Factor Migration and Income Distribution in Some Developing Countries," *Bulletin of Economic Research*, April 1990, 131-140.

Ethier, Wilfred, and Svensson, Lars, "The Theorems of International Trade with Factor Mobility," *Journal of International Economics*, February 1986, 21-42.

Helpman, Elhanan, and Krugman, Paul, *Market Structure and Foreign Trade*, Cambridge: The MIT Press, 1985, Chapter 12.

Jones, Ron, "The Structure of Simple General Equilibrium Models," *Journal Political Economy*, December 1965, 557-572.

Jones, Ron, and Easton, Stephen, "Factor Intensities and Factor Substitution in General Equilibrium," *Journal of International Economics*, August 1983, 65-99.

Kindleberger, C. *American Business Abroad*, New Haven; Yale University Press, 1969.

Krugman, Paul, "Increasing Returns, Monopolistic Competition, and International Trade," *Journal of International Economics*, November 1979, 469-479.

Ruffin, Roy, "Factor Movements and Prices with Three Factors and Two Goods,"

Economics Letters, No. 2, 1981, 177-182.

Ruffin, Roy, and Rassekh, Farhad, "The Role of Foreign Direct Investment in US Capital Outcomes," *American Economic Review*, December 1986, 1126-1130.

Samuelson, Paul, "Prices of Factors and Goods in General Equilibrium," *Review of Economic Studies*, No. 54, 1953-4, 1-20.

Takayama, Akira, "On Theorems of General Competitive Equilibrium of Production and Trade--A Survey of Some Recent Developments in the Theory of International Trade," *Keio Economic Studies*, No. 1, 1982, 1-37.

Thompson, Henry, "Complementarily in a Simple General Equilibrium Model," *Canadian Journal of Economics*, August 1985, 616-621.

Thompson, Henry, and Clark, Don, "Factor Movements with Three Factors and Two Goods in the US Economy," *Economics Letters*, No. 1, 1983, 53-60.

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