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A THEORY OF EXPROPRIATION AND DEVIATIONS FROM PERFECT CAPITAL MOBILITY*

Jonathan Eaton and Mark Gersovitz

There are many reasons why commodity trade fails to equate the rewards to factors of production in different countries. Consequently, there is an incentive for factor movements between countries. While movements of factors, especially capital, are important in the world economy, they have not been sufficient to equate factor returns among countries.

The failure of capital flows to equate returns to capital is frequently attributed to political risks and left outside the sphere of economic analysis. Specifically, investments abroad, especially in LDC's, are said to be more subject to the risk of expropriation, or at least to unpredictable changes in the tax and exchange control regime adopted by the host country. Fears of foreign investors have often been realised: Williams (1975) estimates that about 20 % of the value of foreign investments carried into or made during 1956-72 in LDC's was expropriated without compensation in this period.¹

In the past, researchers in disciplines other than economics have been responsible for most of the analysis of expropriations. We argue that an important set of economic considerations affect the nature of these impediments to capital mobility, and this paper provides a theory of expropriation based on maximising behaviour by host countries and investors. We use this theory to identify industry and national characteristics increasing the threat of expropriation and implying large deviations from equal returns on capital, and to examine host country and home country policies minimising distortions from the threat of expropriation.

Three broad conclusions follow from the analysis: First, the *threat* of expropriation can significantly distort the international allocation of capital even if the *act* of expropriation is relatively rare. In the extreme, acts of expropriation would never occur in a world of perfect foresight and rational decision-making, yet actions by investors to ensure that countries do not expropriate would be distorting.

Second, the ability of a country's government to expropriate foreign investments may actually reduce its welfare. Furthermore, a host may be better off if home governments can retaliate against an expropriating country. Indeed, an increase in the penalty imposed on an expropriating country may increase its welfare; a government's power to expropriate after investments are made may

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¹ See Eaton and Gersovitz (1983) for references to, and discussion of, the empirical evidence.

lead investors to restrict their investments beforehand in a way that makes the host country worse off than if it could not expropriate. This situation is an example of the time inconsistency of optimal policy discussed by Kydland and Prescott (1977).

Third, domestic factor prices may not accurately reflect social returns when the threat of expropriation affects the supply of foreign investment. The social rate of return on capital may exceed its domestic marginal product while the social rate of return on any nationally-owned factor that is also supplied by foreigners and not expropriable may be less than the marginal product of that factor. This result has implications for project evaluation in LDC's.

In Section I we present a simple model of foreign investment with potential expropriation. Its point of departure is MacDougall's (1958) model of foreign investment in the absence of expropriation. A small country produces a single output with three factors. Labour is supplied domestically in a fixed amount and is not internationally mobile. Two other factors, capital and management, are internationally mobile. These two factors differ in that capital can be expropriated; management cannot be. For our purposes, capital represents the tangible aspects of foreign investment: plant, equipment, inventories and other properties left behind after expropriation. Managerial services are the intangible assets that a foreign investor brings to the production process: technical knowledge, organisational capabilities, access to overseas markets and the like. Essential to this analysis is the assumption that if expropriation occurs, the managerial services of the foreign investor are no longer available and cannot be replaced by other foreigners. This situation may arise because foreign managers boycott the expropriating country or because the capital installed by foreign investors is specific to their own managerial skills. *Ex post* the firm's managers may have a unique ability to operate that firm's capital.

In deciding on expropriation, a host must weigh the benefits of obtaining income from foreign capital and the ownership of the capital itself against the costs of losing access to foreign managerial services. For many levels of foreign investment, including the one equating the domestic marginal product of capital to the world interest rate, the benefits of expropriation *may* outweigh the costs. Foreign investors will not increase their investments to the point where expropriation becomes optimal. If the threat of expropriation is binding, the level of foreign investment and national income will be determined by competition among investors and the capacity of the host country to absorb foreign investment without expropriation. One result is that heavier taxation can increase the amount of foreign capital because it reduces the gain from expropriation. Section I discusses the determinants of this equilibrium and the effects of changes in national factor endowments and world factor prices. We also investigate the effects of the threat of expropriation on the distribution of income among national factors. Section II examines the associated consequences of the threat of expropriation for project evaluation and optimal investment decisions in host countries.

In Section III we consider the case of a foreign investor who is a monopolist vis-à-vis a number of potential host countries. The monopolistic investor will

always invest less than competitive investors for a given technology. National income will also be lower.

Section IV examines the consequences of expropriation for technical choice. We show that when a parameter of the production function (e.g., the elasticity of substitution) is a choice variable for the investors, investors may distort the technology to reduce the threat of expropriation. In these cases, the threat of expropriation may raise the equilibrium level of investment *above* the level obtaining under perfect capital mobility. Furthermore, the monopolistic investor may actually invest more than competitive investors, but the host country is still worse off than if the foreign investors were competitive.

In Section V we return to the assumption that investors are competitive but assume that projects are risky and that expropriation transfers this risk to the host country. Risk bearing rather than managerial skill is the contribution of foreign investors that cannot be expropriated. *A host can benefit from increases in the riskiness of projects* if it is risk averse while foreign investors are not, since risk reduces the threat of expropriation.

In Section V we assume that the risk inherent in foreign investment is not resolved until after the expropriation decision must be made. This assumption is appropriate to projects where the risk is ongoing, e.g., agricultural projects subject to annual variation in weather or projects producing output sold in volatile international markets. For other types of projects, uncertainty is resolved before the expropriation decision must be made. This situation may prevail in extractive activity where a mineral discovery resolves the uncertainty before production begins. In Section VI we assume that the national endowment of managerial services is a random variable revealed after the investment decision has been made but before the host decides on expropriation. In this model expropriations can actually occur, in contrast to the preceding models. Foreign investors act in full knowledge of this risk.

Our discussion throughout applies specifically to capital movements in the form of *direct* investment. The host imports not only foreign capital but foreign entrepreneurship as well, either in the form of managerial services or risk bearing.¹ The penalty of expropriation is the loss of this entrepreneurship. These considerations are not relevant to indirect investment since this type of mechanism does not operate to ensure repayment. Capital movements in the form of *portfolio* investment have, however, become increasingly important to less developed countries. Implicit in this form of foreign investment is a set of penalties for non-repayment other than the ones considered here. An important penalty may be exclusion from future participation in international capital markets. Elsewhere (Eaton and Gersovitz, 1981) we analyse financial market equilibrium in which

¹ The very act of direct foreign investment, as opposed to portfolio investment, suggests that the investing firm contributes more to the production process than its capital. Williamson (1981) attributes the existence of large scale corporations in general, and of multinational corporations in particular, to their ability to economise on the costs of transactions that would be required if all exchange occurred through markets. These savings may emerge because of international economies of scale or of scope in production as well as a unique factor of production that is an asset of the firm. Technological know-how and an international marketing network would be examples of such assets. For our purposes it is the loss of this firm-specific asset or of the economies of scale or scope associated with the multinational firm that imposes the costs of expropriation.

the penalty of default is loss of future ability to borrow, while in Eaton and Gersovitz (1983) we analyse expropriation in terms of its effects on future ability to attract foreign capital.

We could have incorporated similar considerations into the current analysis. For simplicity, however, the focus is on a single period of what is a repeated process in the relationship between a host and foreign investors. In contrast to our earlier work we ignore the effect of an expropriation on the host's ability to attract foreign capital in the future. This exclusion is justified if the host has a high discount rate or if it cannot acquire a reputation, perhaps because its government changes frequently. Alternatively, we can incorporate the loss of future investment suffered by an expropriation into a general penalty consequent upon expropriation; these effects are analysed here.

I. A SIMPLE MODEL OF FOREIGN INVESTMENT WITH POTENTIAL EXPROPRIATION

Consider an economy producing a single output (Q) using inputs of labour (L), capital (K) and managerial services (H) where

$$Q = F(K, H, L) \quad (1)$$

$F_i > 0$, $F_{ii} < 0$. The production function $F(\cdot)$ exhibits constant returns to scale. The endowments of each factor possessed by the country are: \bar{L} , \bar{K} and \bar{H} . At the time of foreign investment, capital and managers are completely mobile between countries while workers are entirely immobile. Thus $L = \bar{L}$ while K and H exceed \bar{K} and \bar{H} by the amounts of foreign investment in capital and foreign transfer of managerial skills respectively.

We focus only on situations in which $K > \bar{K}$ and $H > \bar{H}$. If $K < \bar{K}$ the economy we consider is a capital exporter, so that its expropriation of foreign capital is not an issue.¹ If $K > \bar{K}$ while $H < \bar{H}$ the host has nothing to lose from expropriation, since it is not importing foreign managers.² This case thus leads to an equilibrium with no foreign investment.

It is essential for the analysis here that H make a strictly positive contribution to output (i.e., that $F(K, H, L) > F(K, \bar{H}, L)$ for any $H > \bar{H}$) and that H not be subject to expropriation. Otherwise the host could never lose by expropriating and would expropriate *any* amount of foreign capital. Investors would then find *no* amount of investment worthwhile, so that $K \leq \bar{K}$.

The country is small in the international economy, facing a gross rate of return on capital, r , and a managerial reward, s , determined in world markets. Foreign investors borrow investment funds from the world capital market at cost $(r - 1)$ and must repay the principal plus income whether or not expropriation occurs.

Profits of foreign investors if expropriation does not occur (Π^N) are

$$\Pi^N = F(K, H, \bar{L}) - Y^N - r(K - \bar{K}) - s(H - \bar{H}). \quad (2a)$$

¹ We assume that in the event of expropriation any asset abroad of the host country will be seized in retaliation. The benefits of expropriation thus depend only upon the *net* capital position.

² Some loss from expropriation could emerge if $H < \bar{H}$ and the investor's government can retaliate against the host country's managers working abroad, for example by restricting their ability to repatriate their earnings. We do not consider the implications of this form of retaliation.

Here Y^N denotes payment to the host country, its national income, if expropriation does not occur. If expropriation does occur, foreign managerial services are withdrawn, are no longer employed and need not be paid. Further, no payments need be made to host country factors. However, firms must still pay foreign lenders the value of their capital plus income. Thus, in the event of expropriation, the foreign investors receive profits (Π^E) of

$$\Pi^E = -r(K - \bar{K}). \quad (2b)$$

If expropriation occurs, the host country takes over all production of Q ,¹ and receives national income (Y^E) of

$$Y^E = F(K, \bar{H}, \bar{L}). \quad (3)$$

We assume that the host is motivated by a desire to maximise national income. Expropriation is thus optimal if $Y^E > Y^N$ and not otherwise.² The borderline condition $Y^N = Y^E$ defines a relationship between Y^N and K via (3) which we name the *EE* curve. For a given Y^N , investment in excess of the corresponding level of K on the *EE* curve implies expropriation. The slope of this curve is

$$\left. \frac{dY^N}{dK} \right|_{EE} = F_K(K, \bar{H}, \bar{L}) > 0. \quad (4)$$

In the absence of expropriation, profits are Π^N given by (2a). We assume that competition among potential investors guarantees $F_H = s$ and that Y^N is such that

$$\Pi^N = 0. \quad (5)$$

We discuss how the host might extract Y^N below. Equation (5) defines a second relationship between Y^N and K . This is the *II* curve and has slope

$$\left. \frac{dY^N}{dK} \right|_{II} = F_K[K, \hat{H}(K), \bar{L}] - r,$$

where $\hat{H}(K)$ is given by

$$F_H(K, H, \bar{L}) = s. \quad (6)$$

We define K^* as the level of K such that

$$F_K[K^*, \hat{H}(K^*), \bar{L}] = r, \quad (7)$$

i.e., the level of K that would obtain under perfect capital and managerial mobility with no threat of expropriation. Under the usual assumption that $F_{KK}F_{HH} - F_{KH}^2 > 0$, the *II* curve is upward sloping for $K < K^*$ and downward sloping for $K > K^*$.

The *EE* and *II* curves are illustrated in Fig. 1. All points below the *EE* curve

¹ We do not consider the possibility of partial expropriation – the complete takeover of some, but not all, firms. A model of this second type of partial expropriation is similar in conception and results to the model of total expropriation discussed here, but is somewhat more complicated to present.

² Since we are considering a host country that maximises *total* national income, we do not need to consider how income is distributed among nationally-provided factors of production. As we show below, one possible distribution mechanism is for national factors to earn their marginal products, with the host country imposing a tax on the foreign firm in the event that it is not expropriated.

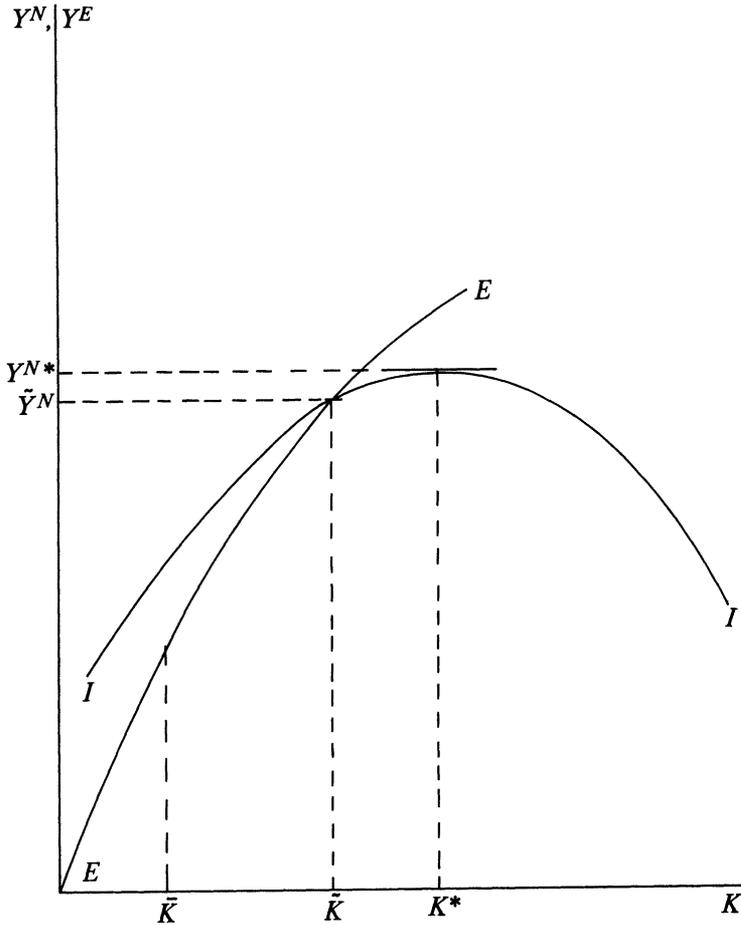


Fig. 1. A constrained competitive equilibrium.

represent situations of expropriation. If these curves intersect only at or to the left of \bar{K} , the EE curve lies everywhere above the II curve for $K > \bar{K}$ and no foreign investment is possible. Any investment would be expropriated. If the EE curve intersects the II curve anywhere to the right of K^* , then the country obtains maximum income of $Y^N = F[K^*, \hat{H}(K^*), \bar{L}] - r(K^* - \bar{K}) - s[\hat{H}(K^*) - \bar{H}]$, since the point (K^*, Y^N) lies above the EE curve. In this case the expropriation constraint is not binding. This situation would arise, for example, if $F(\cdot)$ is Cobb Douglas and $\bar{H} = 0$. In this case, $Y^E = 0$ since output cannot be produced without H .

If the EE curve intersects the II curve between \bar{K} and K^* but not to the right of K^* then the expropriation constraint is binding. Equilibrium is determined at a point such as (\tilde{K}, \tilde{Y}^N) . It is possible that the EE curve cuts the II curve more than once between \bar{K} and K^* with no intersection to the right of K^* . In this case we assume that the host obtains the highest possible income. At this point

the EE curve cuts the II curve from below.¹ Thus, at an equilibrium where the expropriation constraint determines the country's capital stock²

$$F_K(K, \bar{H}, \bar{L}) > F_K[K, \hat{H}(K), \bar{L}] - r, \quad (8a)$$

$$\Pi^N = 0, \quad (8b)$$

$$Y^N = Y^E. \quad (8c)$$

The remainder of this section focuses on this type of equilibrium.

When the threat of expropriation is binding, $K < K^*$ given by (7) and the marginal product of capital exceeds the world interest rate, r . Thus if all domestic factors are paid their marginal products, foreign managers are paid their marginal product and foreign capital is paid r , Euler's theorem implies that the value of total output will exceed the sum of factor payments by a wedge, $\{F_K[\bar{K}, \hat{H}(\bar{K}), \bar{L}] - r\}(\bar{K} - K)$. We assume that competition among potential investors ensures that this wedge accrues to the host country.

There are a number of ways that the host country could extract this wedge. One would be the imposition of a lump-sum tax on foreign investors of this amount. Such a tax would allow the host country to maximise the benefits from foreign investment given that it cannot forswear expropriation. An equivalent tax on foreign investment income is one at rate t_K^* such that $(1 - t_K^*)F_K[\bar{K}, \hat{H}(\bar{K}), \bar{L}] = r$ where the EE and II curves intersect.³ Taxes on foreign capital in LDC's are in fact quite common and can be justified if foreign investment is

¹ Contrasting the equilibrium where the expropriation threat is binding with the unconstrained equilibrium, note that the capital-labour ratio is lower in the first situation while the relative magnitude of H/L is higher if capital and management are substitutes but lower if they are complements. Thus, given a production function, the threat of expropriation distorts factor-hiring decisions. In Section IV we discuss how the threat of expropriation may cause firms to modify the production function itself. Forsyth and Solomon (1977) summarise the evidence on differences in factor proportions by nationality of investor. There appears to be no overall tendency for foreign investors to employ different factor proportions than domestic investors. Wide disparities in either direction exist, however, in specific industries. It would be of interest to know if those industries where the risk of expropriation is *ceteris paribus* greater exhibit relatively labour-intensive production by foreign firms.

² Note that the left-hand side of (8a) is the marginal product of capital holding the employment of managers constant at the national endowment level, \bar{H} . The first term on the right-hand side is the marginal product of capital holding the employment of managers at the optimal level when managers are internationally mobile, \hat{H} . Since we assume $\hat{H} > \bar{H}$, the first marginal product is greater or less than the second as $F_{KH} \leq 0$.

³ If we had made the alternative assumption that the wedge $(F_K - r)(K - \bar{K})$ accrued to investors rather than to the host country, our results would be parallel but not identical. The EE curve would remain the same while the relationship $Y^N = F_K \bar{K} + F_L \bar{L} + s\bar{H}$ would define national income and replace the II curve. Denoting this equation as the II' curve, note that to the left of \bar{K}^* it would lie below the II curve. Thus if foreign investors receive the rent associated with the threat of expropriation, the equilibrium level of investment and national income will be lower than in the case we consider. If this line of thought is to be pursued, a theory is needed to explain how the right to invest is rationed among competing potential foreign investors. We find it more realistic, however, to assume that host countries are able to exploit their position vis-à-vis competitive investors and capture the rents associated with foreign investment. Note that a tax on foreign investment income at rate t_K^* maximises not only national income but the level of foreign investment as well. In the range between 0 and t_K^* an increase in the tax rate on foreign capital income, t_K , actually summons *more* foreign capital: as t_K rises in this range so do the benefits to the host country of *not* expropriating while investors lose only supernormal profits that they do not require to invest. Thus investors can invest more without suffering expropriation. An implication of assuming zero profits on foreign investment is that foreign-owned capital earns less than its marginal product when there is a binding threat of expropriation. Thus if nationally-owned factors earn their marginal products, the nationally- and foreign-owned capital earn different returns. If the government imposes a tax t_K^* on *all* capital income, both nationally- and foreign-owned, however, no differences emerge in the results here since we assume that national capital is inelastically supplied. Thus the tax need not be aimed specifically at foreign capital. When the tax applies to all capital, then both types of capital do in fact earn the same after-tax returns.

already constrained by the threat of expropriation.¹ Maintaining the assumption that the host country does receive the rent on foreign investment, we now analyse the effects of unit changes in national factor endowments and market factor prices on the equilibrium level of investment and on national income when the threat of expropriation is binding.

First consider a unit increase in \bar{K} , the supply of nationally-owned capital. This change shifts the II curve up by an amount r , raising the equilibrium levels of Y^N and K . If the threat of expropriation were not binding, K would remain at K^* while Y^{N*} would rise by r . When the threat of expropriation determines K , however, an increase in national capital raises the total level of capital and raises national income by more than r . The reason for the latter effect is that the total capital stock is increasing by some amount in a situation where its physical product exceeds r , its cost to the country.

A unit increase in \bar{H} shifts the II curve up by s and the EE curve up by $F_H(K, \bar{H}, \bar{L}) > s$. Equilibrium income rises by less than s and may even fall. The level of foreign investment falls. With more national managers expropriation is, *ceteris paribus*, more desirable. This effect leads to a reduction in foreign investment and in the total capital stock.

A unit increase in \bar{L} shifts the II curve up by $F_L(K, \hat{H}, \bar{L})$ and the EE curve up by $F_L(K, \bar{H}, \bar{L})$. Since at equilibrium $\hat{H} > \bar{H}$, income rises by more or less than $F_L(K, \hat{H}, \bar{L})$ and foreign investment rises or falls as $F_{LH} \geq 0$. If labour and managers are complements an increase in \bar{L} increases the benefit accruing to the host from the presence of foreign managers and reduces the incentive to expropriate.

Unit increases in r and s have no effect on the EE curve but shift the II curve down. The equilibrium level of K falls, as does the equilibrium level of Y^N which falls by more than $K - \bar{K}$, the amount by which Y^{N*} falls. Since the host country imports both capital and managerial services, an increase in the prices of these factors reduces income through an adverse terms of trade effect. The loss is greater, however, when the importing country faces a binding threat of expropriation. An increase in the prices of these factors increases the incentive to expropriate at a given level of foreign investment. Foreign investment therefore falls, generating an additional negative effect on host country income. Thus in Fig. 1 a unit increase in r or s shifts the equilibrium income level Y^N down by more

¹ Taxation of foreign capital often takes the form of a requirement that a national of the host country receive a share in the equity of a foreign investment without providing a commensurate share of funds. Citizens of the host country need not obtain this transfer via legal means. It may also be effected via bribes, a form of illegal taxation. Foreign investors do, apparently, frequently pay bribes to host country officials for the right to invest. Taxation may even take the form of anticipated expropriation that allows the investor to earn a competitive return on an investment either because the expropriation is partial or because it occurs at a later date (in a multi-period context). Firms invest knowing that time-consistent behaviour by the host leads to either of these results. This situation is one of an obsolescing bargain; both parties enter into an agreement anticipating that a shift in their relative strengths will lead to a subsequent renegotiation. Such situations do not imply irrational behaviour by investors. Our paper addresses expropriations that render investments regrettable from the investor's viewpoint (i.e. lead to a return less than the market return). Our analysis also indicates, however, how the threat of the type of expropriation we do consider makes other forms of (partial) expropriation appropriate as a form of optimal time-consistent taxation.

than $K - \bar{K}$ or $H - \bar{H}$, the amount by which income in the unconstrained case, Y^{N*} , falls.

If a penalty ($P > 0$) is imposed in case of expropriation equation (3) can be modified to

$$Y^E = F(K, \bar{H}, \bar{L}) - P. \quad (3')$$

An increase in P leaves the II curve unchanged but shifts the EE curve down, increasing foreign investment and national income. Thus a penalty for expropriation in this model will make a capital importer better off.

Finally, we note the distributional consequences of the *threat* of expropriation. For analytic simplicity we assume that the tax implicit in a binding threat of expropriation accrues to the government while the three national factors earn their marginal products. Relative to a situation of perfect capital mobility, capital gains (by $[F_K(K, \hat{H}, \bar{L}) - r] \bar{K}$) while labour loses. National managers earn s independent of the level of foreign investment and are unaffected. In the model of Section VI, where the act of expropriation can actually occur, we discuss the effects of an expropriation itself on the distribution of income among factors.

II. IMPLICATIONS FOR PROJECT EVALUATION

In the previous section, national factor supplies \bar{K} , \bar{L} and \bar{H} were exogenous. From a longer-run perspective, however, the supplies of capital and managerial services are determined by national decisions to invest in physical and human capital. In this section we extend the model to illustrate the implications of expropriation for optimal investment strategies.

In the model developed in Section I national income in any period t was implicitly determined by national endowments of factors and world factor prices in that period. We may therefore write national income in period t as a function of the form

$$Y_t^N = Y(K_t, H_t, L_t, s_t, r_t),$$

where K_t , H_t and L_t are *national* factor supplies in period t . Consider a two-period situation in which at the beginning of the first period (period 0) national supplies of capital, potential workers and managerial services are given by K_0 , N_0 and H_0 , respectively. Capital and the consumption good are identical when produced while training for management requires withdrawal from the labour force for one period. Consumption in period 0 is therefore

$$C_0 = Y(K_0, H_0, L_0, s_0, r_0) - K_1 + K_0, \quad (9)$$

where

$$L_0 = N_0 - H_1 + H_0.$$

If preferences are a function of period 0 consumption and period 1 national income, $U(C_0, Y_1)$, then H_1 and K_1 will be chosen so that

$$-U_1 + U_2 Y_{K_1} = 0, \quad (10)$$

$$-U_1 Y_{L_0} + U_2 Y_{H_1} = 0. \quad (11)$$

Differentiating Y_1 with respect to K_1 and H_1 gives

$$Y_{K_1} \equiv \frac{dY^{N_1}}{dK_1} = r_1 + \{F_K[K, \hat{H}(K), L_1] - r_1\} \frac{dK}{dK_1} \quad (12)$$

and

$$Y_{H_1} \equiv \frac{dY^{N_1}}{dH_1} = s_1 + \{F_K[K, \hat{H}(K), L_1] - r_1\} \frac{dK}{dH_1} \quad (13)$$

From the condition that $Y_1^E = Y_1^N$ in a constrained equilibrium

$$\frac{dK}{dK_1} = \frac{r_1}{F_K(K, H_1, L_1) + r_1 - F_K[K, \hat{H}(K), L_1]}, \quad (14)$$

and

$$\frac{dK}{dH_1} = \frac{-[F_H(K, H_1, L_1) - s_1]}{F_K(K, H_1, L_1) + r_1 - F_K[K, \hat{H}(K), L_1]}. \quad (15)$$

In equilibrium $dK/dK_1 > 0$; otherwise the EE curve would not cut the II curve from below. Thus, since $F_K(K, \hat{H}, L_1) - r_1 > 0$, the social return to national capital exceeds the world interest rate r_1 . Furthermore, if managers and capital are complements, $F_K(K, H_1, L_1) < F_K[K, \hat{H}(K), L_1]$. In this case

$$Y_{K_1} > F_K[K, \hat{H}(K), L_1]$$

using (14); i.e., the social return to national capital exceeds its marginal physical product. Conversely, if K and H are substitutes, $F_K(K, H_1, L_1) > F_K[K, \hat{H}(K), L_1]$ and the return to capital lies between the domestic marginal physical product and the world interest rate. In the first case increasing the capital stock increases the productivity of managers, thereby reducing the incentive to expropriate. The converse obtains in the second case.

An increase in the supply of national managerial services, on the other hand, increases income by less than the world reward to managerial services, s_1 , which equals the domestic marginal product of managerial services. By reducing reliance on foreign managerial services, an increase in H_1 reduces the availability of foreign capital. This effect may operate to such an extent that $Y_{H_1} < 0$, i.e. increases in H_1 actually lower national income.

In summary, when the threat of expropriation is binding it is optimal to deviate from both marginal product and world price rules in investment decisions. As long as capital and managers are complements both rules tend to underestimate the marginal social product of capital and to overstate the marginal social product of managers.

III. INVESTMENT BY MONOPOLISTIC INVESTORS

In Section I investors were perfectly competitive; the host could extract a payment that drove profits to zero. Facing a large number of potential investors, the host would only accept investment projects yielding zero profits to the investor. We now turn to the case in which the foreign investor is a monopolist vis-à-vis a large number of host countries, but remains competitive in world markets for capital and managerial services.¹ The threat of expropriation nevertheless exists.

¹ An alternative assumption is that one investor faces one host, leading to a Cournot-Nash or similar game-theoretic analysis, a topic which we leave to possible future analysis.

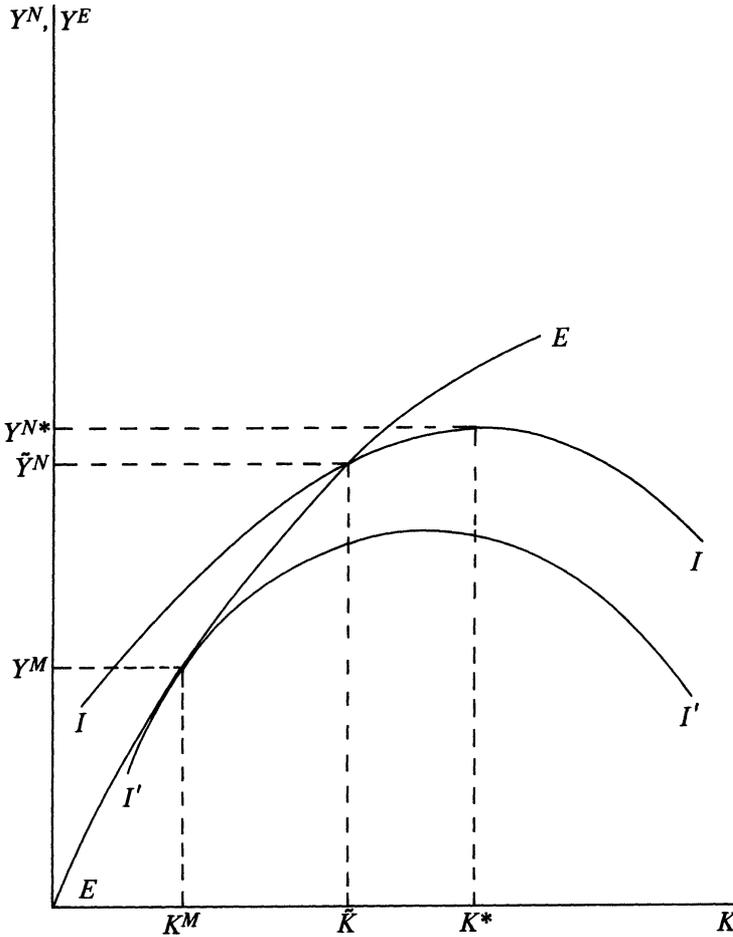


Fig. 2. The equilibrium of the monopolist.

We return to the one-period case, taking national factor endowments, \bar{K} , \bar{H} and \bar{L} , as given.

The EE curve defined in Section I continues to give the minimum amount of income a host must receive in order not to expropriate as a function of its total domestic capital stock \bar{K} . The monopolist's problem is to choose Y^N , K and H to maximise Π^N , given in expression (2a), subject to the constraint $Y^N \geq Y^E$ given by the EE curve.

For any K the monopolist will choose H to satisfy (6). Hence $\hat{H}(K)$ continues to define the optimal level of managerial input as a function of the capital stock in place. Incorporating $\hat{H}(K)$ into expression (2a), the relationship

$$\Pi^N = F[K, \hat{H}(K), \bar{L}] - r(K - \bar{K}) - s[\hat{H}(K) - \bar{H}] - Y^N \tag{16}$$

establishes a set of isoprofit loci in (Y^N, K) space. The curve corresponding to $\Pi^N = 0$ is the II curve derived in Section I. Curves lying successively below the II curve correspond to successively lower Y^N , given K , and hence to successively higher profit, and conversely.

The monopolist's problem is thus to choose the lowest isoprofit curve compatible with $Y^N \geq Y^E$. Since at the constrained competitive equilibrium the II curve intersects the EE curve from above, the profit-maximising equilibrium lies southwest of the competitive equilibrium: less is invested and host country income is lower.

Fig. 2 illustrates a monopolistic equilibrium with positive investment. The curve $I'I'$ is the lowest attainable isoprofit locus. Total capital is given by K^M and host country income by Y^M . These magnitudes are both below their respective competitive levels, \bar{K} and \bar{Y}^N .

Note that for the second-order condition to be satisfied the $I'I'$ curve must be more concave than the EE curve at the point of tangency. If no such tangency exists then no foreign investment takes place. Note also that in the case of monopoly the threat of expropriation is always binding: since the EE locus is everywhere upward sloping it can never have a point of tangency with an isoprofit locus at the latter's maximum.

Consider again a penalty P that the host country would suffer if it should expropriate. In this case the host country will receive only

$$Y^E = F(K, \bar{H}, \bar{L}) - P$$

in the event of expropriation. An increase in P shifts the EE curve down without changing the II loci. At the new equilibrium Y^M is lower and profits are higher. *The existence of the penalty increases monopoly profits and reduces national income even though expropriation does not take place*, in contrast with the competitive case, where the penalty raises national income.

IV. POTENTIAL EXPROPRIATION AND THE DISTORTION OF TECHNOLOGY

In Section I the threat of expropriation was shown to imply a distortion in factor use. Too little capital was invested by foreigners so that the economy's capital-labour ratio (K/L) was below the unconstrained optimum. Other forms of distortion may be consequences of a threat of expropriation.

The notion is that there are many technological choices that a firm can make that are not well described by the simple three-factor, constant-returns-to-scale production function; an enriched model opens up possibilities that were precluded in the preceding sections. By way of example, Magee (1977) discusses expenditures that foreign investors may make to conceal the nature of their production process. Or one could imagine a firm sacrificing output or its own *ex post* flexibility to choose a production function that has a very low *ex post* elasticity of substitution among factors. Thus, if it were to withdraw its managerial labour the host would face relatively large substitution problems.¹ Or, to borrow an analogy from

¹ For instance, $F(\cdot)$ might be a three factor production function with *ex post* elasticity of substitution σ assumed constant and common between all pairs of factors minus a cost $C(\sigma)$ of setting σ . If $C(\sigma^*) = 0$, $\sigma = \sigma^*$ would be chosen under most circumstances. However, with potential expropriation it may be optimal for the host if firms choose $\sigma < \sigma^*$ at cost $C(\sigma) > 0$. This outcome is preferred because Y^N can be raised by the additional deterrent provided by the *ex post* inflexibility of technology.

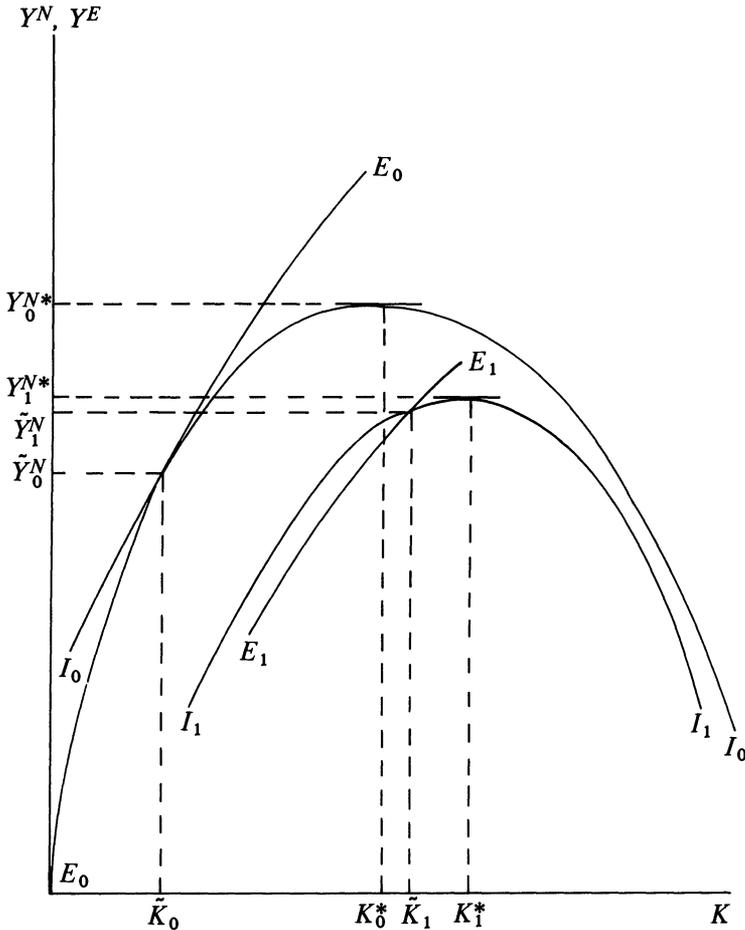


Fig. 3. A competitive equilibrium where the distortion of technology implies that $\bar{K}_1 > K_0^*$, $\tilde{Y}_1^N > \tilde{Y}_0^N$.

weapons transfers among countries, it may be desirable to choose equipment that is both more complicated and more expensive than necessary to make operation more difficult without foreign assistance. Evidence on the prevalence of these phenomena is likely to be difficult to obtain, but we believe the theoretical possibilities deserve attention.

A very general formulation of these ideas is that the firm's profit in the absence of expropriation is given by

$$\Pi^N = F(K, H, \bar{L}, \gamma) - s(H - \bar{H}) - r(K - \bar{K}) - Y^N, \tag{17}$$

where γ is a parameter of the production function chosen by the investor. In the event of expropriation, national income is

$$Y^E = J(K, \bar{H}, \bar{L}, \gamma), \tag{18}$$

where $J(\cdot)$ is the country's production function after expropriation.

Once the possibility of distorting technology is introduced, two conclusions from the previous analysis need not obtain. First, the level of investment occurring in competitive equilibrium under a threat of expropriation may *exceed* that obtaining under perfect capital mobility. Second, a monopolistic investor may invest *more* than the competitive equilibrium level of capital.

These propositions can be illustrated graphically. In Fig. 3 the curves I_0I_0 and E_0E_0 constitute the *II* and *EE* curves derived in Section I if the technological parameter γ assumes some value, say 0, that would maximise national income in the absence of a threat of expropriation. At another value of γ , say 1, the *II* and *EE* curves might be given by I_1I_1 and E_1E_1 . Even though in the absence of a binding expropriation threat the undistorted technology would provide higher national income, in the presence of such a threat the distorted technology can yield higher income. As a consequence of competition among potential investors this technology would emerge. Nothing precludes the possibility that $\tilde{K}_1 > K_0^*$, in which case more capital is installed *because* of the threat of expropriation. This possibility requires that

$$F_K[K_0^*, \hat{H}(K_0^*), \bar{L}, 1] > F_K[K_0^*, \hat{H}(K_0^*), \bar{L}, 0] = r, \quad (19)$$

i.e. that the distortion of technology augment the marginal product of capital to the investor.

A possibility is that changing γ from 0 to 1 may shift the *EE* curve so far that, at the new equilibrium, the threat of expropriation is not binding. In this case the curve E_1E_1 would intersect the I_1I_1 curve to the right of K_1^* , and equilibrium would obtain at (Y_1^*, K_1^*) .

To establish the second proposition let I_0I_0 , $I'_0I'_0$ and E_0E_0 drawn in Fig. 4 denote the zero profit locus, the maximum profit locus and the *EE* curve, respectively, when $\gamma = 0$. As before, the choice of $\gamma = 0$ is assumed to maximise national income in the absence of an expropriation threat. Let I_1I_1 , $I'_1I'_1$ and E_1E_1 denote these same curves when $\gamma = 1$. Under competition, the distorted technology yields lower income even if the expropriation threat is binding for the particular case illustrated. The competitive equilibrium would yield $\gamma = 0$ and the national income would equal \tilde{Y}_0 . The monopolist may nevertheless find that $I'_1I'_1$ corresponds to a higher profit level than $I'_0I'_0$. A possibility is that the monopolist's capital stock, K_1^M , is greater than that which would emerge in the competitive case, \tilde{K}_0 . Indeed, $K_1^M > K_0^*$ is possible, in which case the monopolist invests *more* when the threat of expropriation is binding than would be invested in a competitive equilibrium without any expropriation threat. The monopolist may find that, by distorting his technology in a way that increases the marginal product of capital to him, he reduces the usefulness of his capital stock to a potential expropriator, thereby reducing required compensation to the host country. Because the marginal product of capital is greater with this distortion, he invests more than competitive investors who, in this case, do not install a distorted technology.

The distortion of technology, in terms of its effects on the welfare of the host country, is analogous to an increase in the penalty P suffered by the host in the event of expropriation. When potential investors are competitive, the host

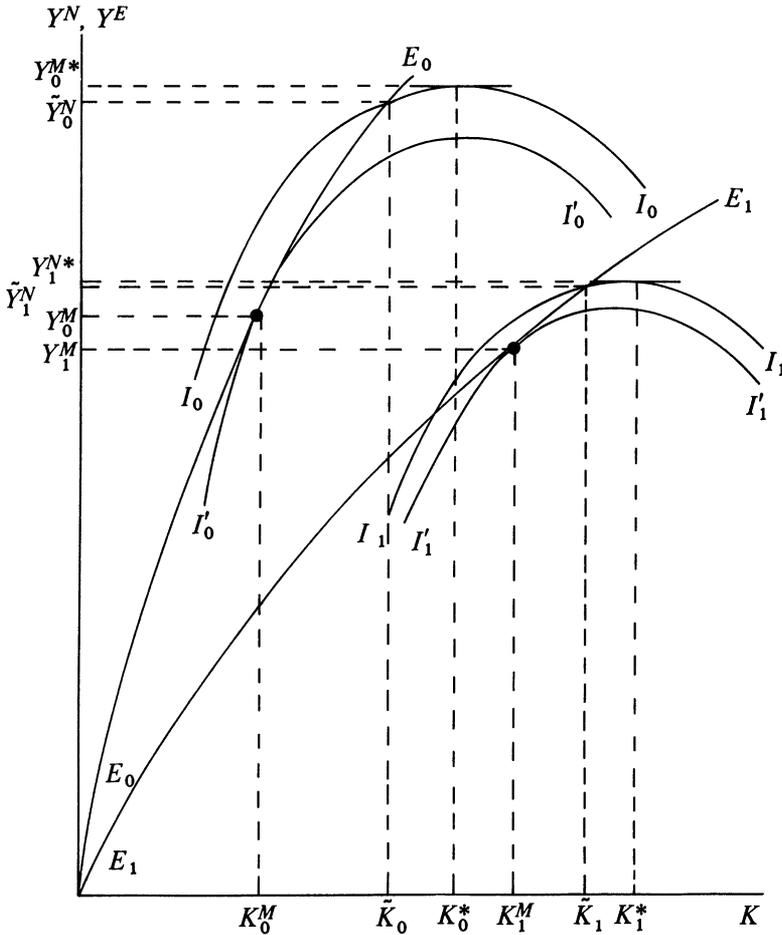


Fig. 4. The monopolistic and competitive equilibria where the distortion of technology implies that $K_1^M > \bar{K}_0$.

country benefits from the ability of investors to distort technology. The ability of a monopolistic investor to distort technology, however, acts to the host's detriment.

V. OPTIMAL INVESTMENT IN RISKY PROJECTS

In Sections I to IV foreign investment was riskless. Frequently, however, foreign investors engage in risky activities and bear much of this risk. In expropriating such activities the host assumes the risk inherent in these activities.

We assume that domestic production (Q) is given by the function

$$Q = \theta F(K, L). \tag{20}$$

The variable θ is random. In this section we abstract from managerial services. National endowments of capital and labour are \bar{K} and \bar{L} . Capital is mobile across borders before the investment takes place while labour is not. Capital is in place

at the time θ is known and cannot be withdrawn. Expropriation must also be chosen before the true value of θ is known. Investors are competitive and either are risk neutral or can diversify the risk completely.

In the absence of expropriation, host income is Y^N regardless of θ . If expropriation occurs, national income (Y^E) depends on θ :

$$Y^E = \theta F(K, \bar{L}). \quad (21)$$

Expropriation will be optimal if $E[U(Y^E)]$ exceeds $U(Y^N)$ and not otherwise where $U(\cdot)$ is the host's utility of income. Since $E[U(Y^E)]$ increases in K , the condition

$$E[U(Y^E)] = U(Y^N) \quad (22)$$

implicitly defines a level of K , denoted $\tilde{K}(Y^N)$ such that $K > \tilde{K}$ implies that expropriation is optimal and not otherwise. Note that $\tilde{K}'(Y^N) > 0$.

If expropriation occurs foreign investors will earn profits of

$$\Pi^E = -r(K - \bar{K}) \quad (23)$$

assuming, as before, that foreign sources of capital must be paid regardless. If expropriation does not occur then profits are

$$\Pi^N = \theta F(K, \bar{L}) - r(K - \bar{K}) - Y^N. \quad (24)$$

Firms maximise expected profits. If the threat of expropriation did not exist then investment would occur until

$$E[\theta F_K(K, \bar{L}) - r] = 0. \quad (25)$$

We denote the level of K satisfying (25) by K^* .

Competition among investors and taxation of the type discussed in Section I will raise Y^N to the point where

$$E[\theta F(K, \bar{L}) - Y^N - r(K - \bar{K})] = 0. \quad (26)$$

We denote by Y^{N*} the level of Y^N satisfying (26) at $K = K^*$. If $K^* < \tilde{K}(Y^{N*})$ then K^* is an equilibrium level of total investment and Y^{N*} an equilibrium level of national income. At this equilibrium the threat of expropriation is not binding. If, however, $K^* > \tilde{K}(Y^{N*})$ investment at a level of K^* will lead to expropriation and the equilibrium level of investment will be constrained.

We depict the resulting equilibrium in Fig. 5. Values of K and Y^N consistent with competition in international capital markets, i.e., satisfying (26), are illustrated by the curve II . Values satisfying the no-expropriation condition with strict equality, i.e.,

$$E\{U[\theta F(K, \bar{L})]\} = U(Y^N), \quad (27)$$

are illustrated by the curve EE .

The slope of II is given by

$$\left. \frac{dY^N}{dK} \right|_{II} = E(\theta_{K^*} - Fr), \quad (28)$$

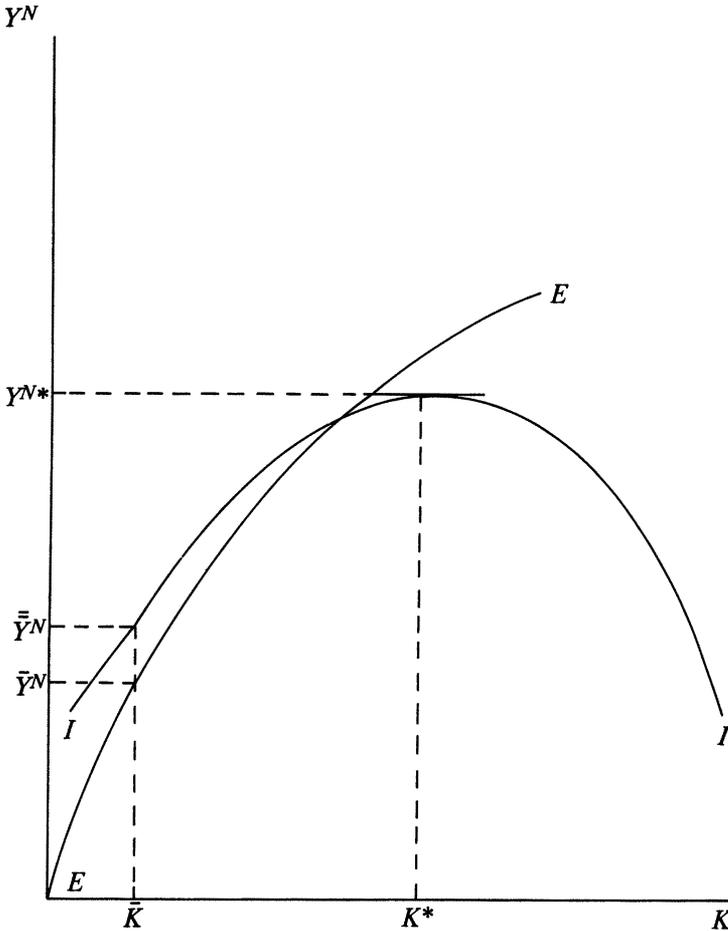


Fig. 5. Foreign investment in, and expropriation of, risky projects.

which is positive for $K < K^*$ and negative for $K > K^*$. Thus the II curve achieves a maximum at K^* where it provides Y^{N*} . The EE curve has slope

$$\left. \frac{dY^N}{dK} \right|_{EE} = \frac{E\{U'[\theta F(K, \bar{L})] \theta F_K\}}{U'(Y^N)} > 0. \tag{29}$$

The expected output if no investment occurs is

$$\bar{\bar{Y}}^N \equiv E(\theta) F(\bar{K}, \bar{L}). \tag{30}$$

This is the amount risk-neutral investors are willing to pay to produce in the host country without investing any foreign capital. We define \bar{Y}^N by the relationship

$$E\{U[\theta F(\bar{K}, \bar{L})]\} = U(\bar{Y}^N), \tag{31}$$

i.e., \bar{Y}^N is the amount investors must pay the host for the right to use domestic factors if they make no investment themselves.

If U is concave then $\bar{Y}^N < \bar{\bar{Y}}^N$. In this case the EE and II curves will cross to the

right of \bar{K} , i.e., there will exist at least one equilibrium compatible with: (1) competitive international capital markets, (2) no expropriation and (3) a positive level of foreign investment. *Thus if the host is risk averse while investors are risk neutral, some investment will occur.* If the EE and II curves cross to the right of K^* the equilibrium will be characterised by K^* and Y^{N*} and the threat of expropriation is not binding. If the curves cross only to the left of K^* the competitive equilibrium levels of K and Y are constrained by the threat of expropriation. If the EE curve cuts the II curve more than once, we assume, as before, that the equilibrium with the highest Y^N obtains. We next determine the effects of increases in risk and in $E(\theta)$, \bar{K} , \bar{L} and r on the equilibrium levels of K and Y when the EE curve cuts the II curve from below and the threat of expropriation is binding ($K < K^*$).

First, if output becomes more uncertain, a risk-averse host country is less willing to expropriate. A lower level of compensation Y^N is required to forestall expropriation of a given capital stock. The EE curve shifts down. Risk-neutral investors do not require a higher expected return, so the II curve does not shift. The equilibrium values of Y^N and K rise. *Paradoxically, then, an increase in the riskiness of investment can actually increase national income and national welfare by reducing the incentive to expropriate and attracting foreign investment.*

Given K , an increase in $E(\theta)$ shifts both the EE and II curves up by an amount F . Income, but not the level of foreign investment, rises.

An increase in \bar{L} shifts the II curve up by an amount

$$\left. \frac{dY^N}{d\bar{L}} \right|_{II} = E(\theta) F_L \quad (32)$$

and the EE curve by

$$\left. \frac{dY^N}{d\bar{L}} \right|_{EE} = \frac{E(U'\theta F_L)}{E(U')} = E(\theta) F_L + \frac{\text{cov}(U', \theta F_L)}{E(U'')} \quad (33)$$

If the host country is risk averse U' is a decreasing function of θ and the second term in the far right version of (33) is negative. Hence the II curve shifts up by more than the EE curve. Y^N rises by more than $E(\theta) F_L$ and foreign investment rises. Because an increase in \bar{L} raises the riskiness as well as the level of output, the host obtains more capital.

An increase in \bar{K} or a reduction in r increases income. As in the certainty model, this effect is larger when the threat of expropriation is binding relative to a situation of perfect capital mobility.

VI. INVESTMENT WHEN EXPROPRIATION IS UNCERTAIN

In previous sections we have presented models in which expropriation never actually occurs. In a deterministic context, or in a context in which the expropriation decision must occur before any randomness is resolved, expropriation can be predicted exactly, and rational, fully-informed investors will not make investments that will be expropriated. If, however, some random process affecting the desirability of expropriation is resolved between the time of the investment

and the expropriation decision, investments may be expropriated. Investors make such investments accepting this risk.

Although the investigation of a model with stochastic expropriation is considerably more difficult than the preceding analysis it is crucially important to an understanding of the expropriation issue. To illustrate this phenomenon, consider again the model developed in Section I, but assume that the supply of *national* managers, \bar{H} , is given by a function $\bar{H}(\theta)$ increasing in θ , where θ is a random variable uniformly distributed on $[0, 1]$. The realisation of θ is not known when investment takes place but is revealed before the expropriation decision. A number of other variables could be random. Introducing uncertainty in the supply of national managers provides one simple means of illustrating some aspects of stochastic expropriation.

National income, if expropriation does not take place, is given by

$$Y^N(\theta) = r^d \bar{K} + w \bar{L} + s \bar{H}(\theta) = F[K, \hat{H}(K), \bar{L}] - F_K(K - \bar{K}) - s[\hat{H}(K) - \bar{H}], \quad (34)$$

where r^d is the interest rate paid national capital, w the wage and other variables are defined in Section I. The third part of equation (34) follows from Euler's theorem and our assumption that national factors receive their marginal products. In contrast to the deterministic case, such payments will exhaust product, as we show below. The profits of foreign firms, if expropriation does not occur, are, as before,

$$\Pi^N = F[K, \hat{H}(K), \bar{L}] - Y^N - r(K - \bar{K}) - s[\hat{H}(K) - \bar{H}]. \quad (35)$$

In the event of expropriation, however, national income becomes

$$Y^E(\theta) = G[K, \bar{H}(\theta), \hat{H}(K), \bar{L}], \quad (36)$$

where

$$G[K, \bar{H}(\theta), \hat{H}(K), \bar{L}] \equiv \max\{F[K, \bar{H}(\theta), \bar{L}], F[K, \hat{H}(K), \bar{L}] + s[\bar{H} - \hat{H}(K)]\}, \quad (37)$$

since it is now possible that $\bar{H}(\theta) > \hat{H}(K)$ for high values of θ . The possibility of the host's exporting managerial services was ruled out in the deterministic model of Section I. With expropriation profits are simply, as before,

$$\Pi^E = -r(K - \bar{K}). \quad (38)$$

Expropriation becomes optimal, then, when $Y^E > Y^N$ and not otherwise. Note that both Y^E and Y^N are increasing in θ , and that

$$\frac{dY^N}{d\theta} = s\bar{H}', \quad (39)$$

while

$$\frac{dY^E}{d\theta} = \begin{cases} F_H[K, \bar{H}(\theta), \bar{L}] \bar{H}' & \text{if } F[K, \bar{H}(\theta), \bar{L}] \geq F[K, \hat{H}(K), \bar{L}] + s[\bar{H} - \hat{H}(K)] \\ s\bar{H}' & \text{if } F[K, \bar{H}(\theta), \bar{L}] < F[K, \hat{H}(K), \bar{L}] + s[\bar{H} - \hat{H}(K)] \end{cases} \quad (40)$$

so that

$$\frac{dY^N}{d\theta} \leq \frac{dY^E}{d\theta}$$

i.e. as θ rises, expropriation becomes more desirable.

The value θ^* is defined by the condition

$$Y^N(\theta^*) = Y^E(\theta^*) \quad (41)$$

or

$$\theta^* = 0 \text{ if } Y^E(0) > Y^N(0) \text{ or } \theta^* = 1 \text{ if } Y^N(1) > Y^E(1).$$

Thus $(1 - \theta^*)$ is the probability of expropriation. If $\theta \leq \theta^*$ the national supply of managers is too low to make expropriation worthwhile while if $\theta > \theta^*$ the converse is true. Since θ is uniform on $[0, 1]$

$$\theta^* = \Pr(\theta \leq \theta^*).$$

Expected profits are given by

$$E(\Pi) = \theta^* \{F[K, \hat{H}(K), \bar{L}] - r^d \bar{K} - s \hat{H}(K) - w \bar{L}\} - r(K - \bar{K}). \quad (42)$$

We assume that investors are atomistic, and take not only r and s , but r^d , w and θ^* as given; individual investors invest too little to consider their investments to affect national factor prices or the probability of expropriation. Competition among investors implies zero expected profits

$$E(\Pi) = 0. \quad (43a)$$

This condition, along with the assumption that national factors and foreign managers are paid their marginal products and Euler's theorem, implies that

$$\theta^* F_K - r = 0 \quad (\text{if } \theta^* > 0). \quad (43b)$$

But this result is equivalent to the first-order condition of $E(\Pi)$ with respect to K . In a situation of stochastic expropriation, the host need not impose a tax of t_K^* to ensure zero expected profits; the probability of expropriation, $(1 - \theta^*)$, plays an analogous role.

Relationship (43b) gives values of K and θ^* consistent with zero profits. As before we denote this locus the II curve. The II curve has slope:

$$\left. \frac{d\theta^*}{dK} \right|_{II} = - \frac{\theta^* (F_{KK} F_{HH} - F_{KH}^2)}{F_K F_{HH}}. \quad (44)$$

If F is a well-behaved production function, the principal minors alternate in sign and $F_{KK} F_{HH} > F_{HK}^2$, implying that the II curve slopes upward. An increase in θ^* increases the expected return on capital, increasing K . The II curve is drawn in Fig. 6. At $\theta^* = 0$ expropriation is almost certain and $K = \bar{K}$; no foreign investment takes place. At the other extreme, if $\theta^* = 1$ expropriation is almost certain not to occur, and $K = K^*$, where

$$F_K[K, \hat{H}(K), \bar{L}] = r$$

defines K^* .

Relationship (41) defines θ^* as another function of K and exogenous variables. As before we call it the EE curve. It has slope

$$\left. \frac{d\theta^*}{dK} \right|_{EE} = \frac{F_{HH} G_K + (F_{HH} F_{KK} - F_{HK}^2) (K - \bar{K})}{F_{HH} (s - G_H) \bar{H}'} \quad (45)$$

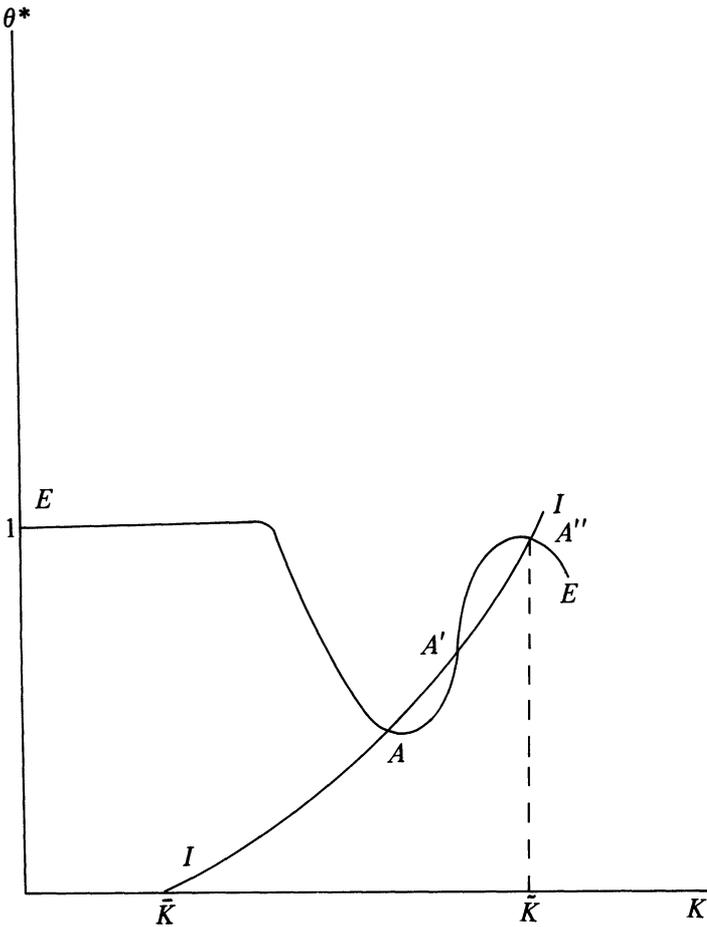


Fig. 6. The equilibrium capital stock and probability of expropriation.

which is ambiguous in sign. The ambiguity arises because an increase in K raises income whether expropriation occurs or not. In general we cannot say in which state income rises more. Because of this ambiguity equilibria with higher levels of foreign investment may, *ceteris paribus*, be associated with a *lower* probability of expropriation.

Whatever the slope of the EE curve, however, it lies completely to the right of \bar{K} for $\theta^* < 1$; at $K = \bar{K}$, $Y^N \geq Y^E$ for all values of θ . If $K = \bar{K}$, the host country gains no capital by expropriating but loses its ability to import managerial services. Consequently the threat of expropriation never prohibits foreign investment entirely.

The EE and II curves may cross several times as illustrated in Fig. 6. Because θ^* tends to zero as K tends to infinity, the last intersection of these two curves must have the EE curve cutting the II curve from above.

The expected value of the host's income, $E[Y(\theta)]$, is given by

$$E(Y) = \int_0^{\theta^*} Y^N(\theta) d\theta + \int_{\theta^*}^1 Y^E(\theta) d\theta. \quad (46)$$

Using (34), (41), (43*b*) and (44), it can be shown that

$$\left. \frac{dE(Y)}{d\theta^*} \right|_{II} = \left[\frac{\theta^*(F_{KH}^2 - F_{KK}F_{HH})(K - \bar{K})}{F_{HH}} + \int_{\theta^*}^1 G_K d\theta \right] \left. \frac{dK}{d\theta^*} \right|_{II} > 0, \quad (47)$$

i.e. $E(Y)$ increases along the II curve. We assume, as before, that the host country ensures that the highest intersection of the EE and the II curves is chosen.

The local effects of increases in \bar{K} , \bar{L} , $E(\bar{H})$, r and s are determined by the effect of these changes on the positions of the II and EE curves:

First consider an increase in \bar{K} . The II curve is unaffected while the EE curve shifts up. The equilibrium levels of θ^* and K rise; i.e., total investment rises and the probability of expropriation declines. As in the preceding models, national capital does not crowd out foreign capital one-for-one.

Second, if \bar{L} increases the II curve shifts down (which follows from Euler's theorem applied to the marginal products of a constant return to scale production function) while the direction of the shift in the EE curve is ambiguous. Consequently θ^* and K may rise or fall.

Third, if the distribution of θ changes to dominate the original in the first-order sense, i.e. if larger numbers of domestic managers become more probable, the II curve is unaffected while the EE curve shifts down. Foreign investment falls and the probability of expropriation, $1 - \theta^*$, rises.

Fourth, an increase in r , the world interest rate, shifts the II curve upward while the EE curve is unaffected. The level of investment falls while the probability of expropriation also falls if the EE curve slopes up but rises if it slopes down.

If s rises the EE curve shifts down while the shift in the II curve is ambiguous. The effects on θ^* and K are therefore indeterminate.

Introducing an exogenous penalty in amount P imposed by the home country on an expropriating host does not affect the II curve while the EE curve becomes

$$F[K, \hat{H}(K), \bar{L}] - F_{\bar{K}}(K - \bar{K}) - s[\hat{H}(K) - \bar{H}(\theta^*)] = G[K, \bar{H}(\theta^*), \bar{L}] - P. \quad (41')$$

An increase in the penalty shifts the EE curve upward so that the level of investment, K , rises while the probability of expropriation, θ^* , falls.

As long as capital and managers are complementary factors the penalty raises the income of the host country in any state of nature, even in states where expropriation actually occurs and the penalty is imposed. First, in any state in which expropriation does not occur, host-country income rises, as may be shown by differentiating the third part of (34) with respect to K . In state θ^* host-country income is the same whether or not expropriation occurs. Since $Y^N(\theta^*)$ rises as a result of the penalty, so must $Y^E(\theta^*)$. Thus

$$\frac{dY^N(\theta^*)}{dP} = \frac{dY^E(\theta^*)}{dP} = G_{\bar{K}}[K, \bar{H}(\theta^*), \bar{L}] \frac{dK}{dP} - 1 > 0. \quad (48)$$

As long as $G_{KH} > 0$, if $G_{\bar{K}}[K, \bar{H}(\theta^*), \bar{L}] > 1$ then $G_{\bar{K}}(dK/dP) > 1$ for all $\theta > \theta^*$. Thus, even in states when the penalty is imposed, the existence of the penalty

raises income: the positive, indirect effect of the penalty in raising the level of the capital stock dominates the direct, negative effect of the penalty.¹

In Section I we discussed the implications of a binding *threat* of expropriation on income distribution. We now consider the distributional implications of expropriation itself.² Of course the effect of expropriation on income distribution depends on how the income from the expropriated capital is distributed among factors. If expropriation raises national income as a whole this income can be distributed in a way that harms no domestic factor. For analytic convenience, however, we will assume that income accrues to a fourth party, perhaps the government.

First, note that if $\bar{H}(\theta) > \hat{H}(K)$ when expropriation occurs, only $\hat{H}(K)$ managers will be employed domestically. In this case expropriation does not affect the domestic levels of factor use. Hence, for this case, the act of expropriation has no distributional effects since marginal products are unaffected.

If, however, $\bar{H}(\theta) < \hat{H}(K)$, only $\bar{H}(\theta)$ managers will be available domestically after an expropriation. Managers will gain, since they earn

$$F_H[K, \bar{H}(\theta), \bar{L}] > s = F_H[K, \hat{H}(K), \bar{L}].$$

Labour gains or loses as $F_{LH} \lessgtr 0$ while capital gains or loses as $F_{KH} \lessgtr 0$; that is, factors complementary with managerial services lose while substitutes gain. Both capital and labour may lose from an expropriation but both cannot gain (via Euler's theorem applied to F_H).

To summarise, an increase in the probability of expropriation, if expropriation does not occur, tends to benefit national capital, harm labour and leave national managers unaffected relative to a situation of perfect capital mobility. If all factors are complements, expropriation itself will either leave all factors unaffected relative to a situation of no expropriation, or harm capital and labour and benefit managers.

Throughout, we have related the expropriation decision to its effect on national income or on the expected utility of national income. Authorities controlling the expropriation decision may be motivated more by the effects of expropriation on various subgroups rather than on the economy as a whole. An extension of our analysis would be a reformulation of the expropriation criterion to account for these distributional preferences.

VII. CONCLUSION

It is widely recognised that the threat of expropriation can create departures from perfect capital mobility. This threat has usually, however, been treated as an exogenous influence not susceptible of economic analysis. In this paper we have

¹ When managers and capital are substitutes ($F_{KH} < 0$), the possibility arises that in some states in which $\bar{H}(\theta) > \bar{H}(\theta^*)$, the increase in K resulting from the imposition of the penalty does not overcome the negative effect on income of the penalty itself. Because the penalty reduces host-country income in these states of nature, we have not been able to prove that *expected* host-country income can never fall as a result of a penalty.

² Tobin (1974) also considers the distributional consequences of an *act* of expropriation. Since he assumes a linear technology and an arbitrary number of factors, his results differ somewhat.

developed a model of expropriation derived explicitly from utility-maximising behaviour on the part of host countries and investors. While our basic model is a simple one in the tradition of neoclassical trade theory, it yields a number of conclusions about the effects of expropriation on the welfare of the host country, on the distribution of income in the host country, on the appropriate shadow pricing of factors of production, on the role of monopolistic investors, and on the choice of technology in production.

While we have explored a number of variants of our model, for instance by introducing uncertainty of two quite different forms, several basic points emerge. The *threat* of expropriation lowers the welfare of a host country facing competitive foreign investors; domestic capitalists benefit from the *threat* of expropriation while the effect on labour is detrimental. Domestic managers are unaffected. If the threat of expropriation constrains the level of foreign investment and capital and managers are complementary, domestic marginal productivities understate the marginal social product of capital and overstate the marginal social product of managers.

A host country benefits from a larger penalty if it were to expropriate when it faces competitive potential foreign investors and when there is no uncertainty about expropriation. This conclusion is reversed if a foreign investor is in a monopoly position vis-à-vis the host country. If investors are competitive but it is uncertain whether or not expropriation will occur at the time the investment is made, the effect of an expropriation penalty is ambiguous. An implication of this model is that, as long as managers and capital are complements, the penalty raises host-country income in *all* states of nature, even those states in which expropriation occurs and the penalty is imposed.

Our theory has a number of implications for empirical research. First, it provides a framework for predicting where deviations from perfect capital mobility are most likely to emerge and suggests a number of testable hypotheses. For example, countries with high endowments of managerial skills relative to physical capital are most likely to remain with a high marginal physical product of capital. Second, the stochastic model of Section VI provides a structure for estimating expropriation probabilities in different countries. Third, the model suggests a number of characteristics of technology and factor employment that might be observed as a consequence of a threat of expropriation. For instance, explanations are implied for observed differences in technologies used by foreign and domestic firms in the same country.

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REFERENCES

- Eaton, J. and Gersovitz, M. (1981). 'Debt with potential repudiation: theoretical and empirical analysis.' *Review of Economic Studies*, vol. 48, no. 152, pp. 289-309.
- (1983). 'Country risk: economic aspects.' In *Managing International Risk* (ed. R. J. Herring). New York: Cambridge University Press.
- Forsyth, D. J. C. and Solomon, R. E. (1977). 'Choice of technology and nationality in manufacturing in a developing country.' *Oxford Economic Papers*, vol. 29, no. 2, pp. 258-82.
- Kydland, R. D. and Prescott, E. C. (1977). 'Rules rather than discretion: the inconsistency of optimal plans.' *Journal of Political Economy*, vol. 85 (June), pp. 513-48.
- Magee, S. P. (1977). 'Information and multinational corporations: an appropriability theory of direct foreign investment.' In *The New International Economic Order: The North-South Debate* (ed. J. N. Bhagwati), Cambridge: MIT.
- MacDougall, G. A. D. (1958). 'The benefits and costs of foreign investment from abroad: a theoretical approach.' *Economic Record*, vol. 36, no. 1, pp. 13-35.
- Tobin, J. (1974). 'Notes on the economic theory of expulsion and expropriation.' *Journal of Development Economics*, vol. 7, no. 1, pp. 7-18.
- Williams, M. L. (1975). 'The extent and significance of the nationalization of foreign-owned assets in developing countries 1956-1972.' *Oxford Economic Papers*, vol. 27, no. 2, pp. 260-73.
- Williamson, O. E. (1981). 'The modern corporation: origins, evolution, attributes.' *Journal of Economic Literature*, vol. 19, no. 4 (December), pp. 1537-68.