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Debt *v*. Foreign Direct Investment: The Impact of Sovereign Risk on the Structure of International Capital Flows

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The paper compares the two standard forms of international investment in developing countries, debt and foreign direct investment (FDI), from a finance perspective. The sovereign risks associated with debt finance are shown to be generally less severe than the ones that come with FDI. FDI is chosen only if the foreign investor is more efficient in running the project, if the project is risky, and if the foreign investor has a good outside option which deters creeping expropriation. The sovereign risk problem of FDI can be alleviated if the host country and the foreign investor form a joint venture.

INTRODUCTION

During the communist era foreign direct investment (FDI) played virtually no role in Eastern Europe. But since the late 1980s, when the legislative framework concerning FDI was liberalized, Eastern Europe has witnessed a substantial inflow of foreign direct investments, in 1996 alone US$15 billion. Still, national experiences differ substantially. While Hungary, the Czech Republic and Poland have been quite successful in attracting foreign investors, the states of the former Soviet Union have been less so. Similarly, annual FDI inflows into all developing countries have reached a record level of US$109.5 billion in 1996, five times the inflow of 1987. However, Latin American and East Asian countries account for almost all of this increase, while FDI to sub-Saharan Africa have stagnated.[1]

One of the advantages of FDI over international credits, it is often argued, is that the investor (typically a multinational enterprise) brings not only capital but also technological know-how and managerial expertise to the host country. However, given that there are alternative ways of transferring capital and technology to Eastern European and developing countries, for example through credits and licensing agreements, the question arises as to which of these alternatives is preferable to the investor. The experience of the international debt crisis of the 1980s brought up a second argument in favour of FDI, i.e. that the flexible payment schedules and extended property rights that come with FDI make the investor less vulnerable to high country risks. But the experience with developing countries shows that direct investments are also subject to sovereign risks. Just as a government can choose to default on its debt services, so it can choose to expropriate the assets of a direct investment. Thus, *a priori* it is not clear which of these alternatives—FDI or, say, credits plus licensing arrangements—dominates.

This paper analyses the pros and cons of FDI compared with other forms of international investments from a finance perspective. Two idealized forms of transferring foreign capital are considered: a combination of a credit and a

licensing agreement ('debt finance'), and foreign direct investment. The leading question of the analysis is how 'safe' these different forms of investment are from the point of view of the foreign investor, given the problem of sovereign risk. I will argue that debt and FDI give different rights to the foreign investor and thus are subject to different risks. In case of debt, the investor has a well defined right on a fixed monetary payment. If the host country defaults on its debt repayment, this may trigger international sanctions such as exclusion from world capital markets or restrictions on international trade. In the case of FDI, the investor has a property right on the physical assets of its investment in the host country, but these assets are prone to nationalization. Again, this is an unambiguous act of expropriation, and, as in case of debt repudiation, it may be punished by international sanctions.

There is a second risk involved in FDI, however. Even if the assets are not nationalized, the returns from the investment may be adversely affected by sovereign acts of the host country such as changes in the tax law, specific import or export duties, or other charges which the investor has to pay. In contrast to debt repudiation or outright nationalization, such forms of 'creeping expropriation' that are designed to capture the return stream of a particular investment project are less visible and are not a clear-cut violation of international trade and investment agreements. Hence it is much more difficult to deter them by international sanctions. The investor can use its control rights only to protect the returns from its investment. For example, it can respond to changes in taxation by transferring some of its production to other plants abroad, possibly at some cost.[2]

The first part of this paper (Sections I–IV) discusses the risks of expropriation more thoroughly and develops a formal model which specifies the two investment alternatives, the options of the host country to expropriate the investment, and the options of the foreign investor to exercise its control rights in case of FDI. We consider how the value of the investment to the foreign investor and to the host country depends on who is in control, what type of goods are produced, and what kind of technology is used for production. It is shown that, if the return streams that can be generated under the control of the host country and the foreign direct investor are the same, there is a clear tendency towards debt finance. Debt finance is more efficient, it is more likely to be viable, and it enables a larger share of the surplus to be given to the foreign investor. However, if the foreign investor is more efficient in running the project, then FDI may become the preferred mode of investment. I show that these results are consistent with the empirical evidence that is so far available.

The second part of the paper considers two extensions of the basic model. First, Section V allows for stochastic returns of the investment. In the case of debt finance, it may happen that the host country is forced into liquidity default in a bad state of the world. If the foreign investor is unable to observe the state of the world and to distinguish between liquidity default and strategic default, then there will be an inefficient punishment of the debtor country with positive probability in equilibrium. Since the return on FDI varies with the state of nature 'liquidity default' is not a problem. This makes FDI comparatively more attractive.

Then Section VI considers a variant of the model in which the foreign investor may engage in a joint venture with the host country. I show that this

reduces the host country's temptation to nationalize and to raise taxes, and that it may increase the overall efficiency of the project. Finally, Section VII concludes and discusses some directions for further research.

There are two strands of literature that are complementary to our approach.[3] The first compares FDI to, say, licensing agreements, without taking into account the problem of sovereign risk. This literature, which has been called the 'eclectic theory of FDI' (Dunning 1981), argues that information asymmetries and market failures in the market for technology make it difficult to transfer technological know-how through licensing.[4] Thus, if the technology is very sophisticated, transaction cost considerations suggest that FDI is the optimal form of investment.

The second strand of literature studies the effects of sovereign risk, but predominantly in the context of debt finance. The central question is how debt finance can be sustained at all. This problem is by now well understood.[5] I use a very simple model of sovereign debt, which reflects the main insights of this literature, as an ingredient of my model. There has been comparatively little theoretical work on the sovereign risks associated with FDI. An important exception is Eaton and Gersovitz (1983, 1984), who analyse foreign direct investment with the threat of potential nationalization. Their first paper develops a reputation model of FDI, assuming that capital is available only through foreign direct investment and that it depreciates completely in a single period. If the host country decides to expropriate the current capital stock, foreign investors will refrain from investing in the future and the country can never again attract foreign capital. Their second paper shows that the threat of nationalization may induce the foreign direct investor to choose an inefficient technology which makes nationalization less attractive to the host country. Thomas and Worrall (1994) analyse the time pattern of FDI in an infinite-horizon model. They show that, in order to mitigate the host country's incentives to expropriate, the investor will underinvest in the beginning of the relationship and increase the investment level over time.

None of these papers distinguishes between expropriation through nationalization on the one hand and creeping expropriation through taxation on the other hand.[6] Furthermore, they do not offer any empirical predictions on when to expect foreign direct investment instead of debt finance.

I. The Risks of Expropriation

Consider a multinational enterprise (MNE) owning a technology that can be profitably employed in a developing country. This investment project requires some initial outlay of capital. Suppose that the developing country is cash-constrained, so it cannot finance the investment alone, while the multinational enterprise has sufficient liquid funds to carry out the project. Under these circumstances there are two possible means of financing the project. First, the MNE could offer a credit to the government of the host country (HC) and license the technology so that HC can carry out and run the project itself. This is the case of *debt finance* in which HC owns and controls the investment project.[7] Second, the MNE could carry out and run the project itself, making a *foreign direct investment* (*FDI*) in the host country. In this case ownership and control of the project remain with the multinational.

An important problem with both types of finance is the political risk of expropriation associated with international investments. Since HC is a sovereign country, it cannot be forced by the courts to honour the terms of a contract it has agreed upon with the foreign investor. Consider the case of debt finance first. If HC defaults on its debt it is impossible for the investor to seize any financial or physical assets of the investment project in the host country or to force it to repay.[8] There is a large literature on this 'sovereign debt problem' which argues that the host country will repay its debt only if the costs of default outweigh the benefits from repudiation. For example, if HC defaults on its debt it may lose access to international capital markets and may not be able to borrow and lend in the future. Furthermore, trade sanctions may be imposed by the rest of the world that reduce HC's gains from international trade. Finally, the multinational may succeed in seizing assets held by the host country abroad. I will not model these different costs of default explicitly but simply assume that HC is punished and has to suffer an exogenously given utility loss $\pi > 0$ if it repudiates its debt.[9]

The political risks of foreign direct investment have received less attention in the theoretical literature. After the MNE has sunk the investment cost in the host country, there are two possibilities for expropriation. First, HC could nationalize the project without paying adequate compensation to MNE. In this case MNE could lose the investment's return stream and *in addition* all control rights over the project. Second, HC could change the rules of the game and try to capture the quasi-rents of the project by increasing taxes, import or export duties and other charges MNE has to pay. While these policies shift returns from MNE to HC, they typically do not affect the control rights over the investment project.

Empirically, both types of expropriation have been of significant importance in the past. Concerning outright expropriation, Kobrin (1980) reports that from 1960 to 1976 there have been at least 1535 cases in 76 less developed countries in which foreign firms were forced to divest. Nationalization was the dominant form of expropriation (50% of all cases) followed by forced sale (32%), forced contract renegotiation (8%, in particular in the mining sector) and various other forms government intervention. The book value of these firms represented 4.4% of the total stock of foreign direct investments in the expropriating countries at the end of 1976.[10] These data include some instances of mass expropriation arising from a shift in political–economic ideology (e.g. Algeria in 1967–72, or Chile in 1971–2). However, 'in the vast majority of countries expropriation was more "selective" rather than mass' (Kobrin 1980, p. 75).

More recently, there have been fewer incidences of outright nationalization, but creeping expropriation has become increasingly important (Andersson 1991).[11] The threat of changes in taxation, specific import or export duties or other charges that the multinational has to pay has been called the 'obsolescing bargain'.[12] This is, in fact, the classical hold-up problem: after investment costs are sunk, the bargaining position of the multinational does not reflect its investment effort, and it cannot prevent the host country from capturing some of the quasi-rents of the projects by increasing taxation. There are several empirical studies confirming this effect.[13]

Note that there are two important differences between outright nationalization and increases in taxation. First, nationalization without

adequate compensation is an unambiguous act of expropriation and a violation of international trade and investment agreements. Thus, as in the case of debt repudiation, nationalization may be punished by the same sort of international sanctions as described above. This is not the case for increases in taxes or tariffs, however. Every country taxes foreign direct investments, and it is difficult to draw the line between fair taxation and expropriation. Furthermore, in contrast to outright nationalization, small changes in the tax system that are specifically designed to expropriate the return stream of a particular investment are much less visible and cannot be verified unambiguously to outside observers on the international capital markets. Thus, increases of taxation cannot be deterred by international sanctions.

The second difference between these two modes of expropriation is the allocation of control rights over the investment project. In case of nationalization, HC takes over control of the project and the multinational is excluded from any decisions to be made on the project in the future. In contrast, a mere increase in taxation, even if it expropriates the entire return stream, leaves MNE in control. In this case, the multinational can respond to changes in taxation by taking several kinds of actions which affect the profitability of the project. In particular, MNEs typically own many investment projects which are geographically diversified over several foreign countries so that they can, at some cost, shift some or all production from one country to another.[14] It is the threat of taking such actions that disciplines taxation in the host country.

II. The Model

This section develops a simple model to compare the two investment forms, debt finance and foreign direct investment. Consider two risk-neutral parties, A and B, who want to finance a joint investment project. A is a multinational enterprise, registered in a developed country, which owns a technology that may be profitably employed in a developing country. B is the government of the host country. The investment project requires an initial outlay of capital $I > 0$. We are interested in the case where B is cash-constrained and has no liquid funds available while A has sufficient cash to pay for I. Without loss of generality, the riskless world interest rate is assumed to be zero, so there is no discounting. If the project is not carried out, both parties get their outside option utilities, which we normalize to 0.[15] As described in Section I, there are two possible means of financing and running the project: debt finance and foreign direct investment.

(a) Debt finance

Under debt finance, A licenses the technology to a firm located in B and gives a credit in order to finance the deal. In this case a debt contract specifies to pay an amount I by A to B in period 0 in order to finance the investment project, and it specifies an amount $D \geqslant I$ to be paid by B to A in period 1 after the investment paid off. Let us assume that A can make sure that the credit is spent by B on the investment project.[16] The repayment (D) will be chosen to

compensate A for its initial capital outlay (I) and for granting the licence to B. In addition, D can be used to split the surplus that may be generated in the relationship.

If B receives the credit and invests I, the project generates a deterministic return $R_B > I$, where the subscript B stands for return under B-control.[17] After B received R_B it has to decide whether or not to repay D. If it repudiates its debt an exogenously given punishment is triggered, e.g. trade sanctions and a temporary exclusion from international capital markets, which yields a utility loss $\pi > 0$ to B. Note that A does not benefit from B's punishment, and that the punishment cannot be renegotiated.[18] Thus, if the investment is financed by debt, final payoffs are given by

$$U_A = \begin{cases} D - I & \text{if B honours its debt,} \\ -I & \text{if B repudiates,} \end{cases}$$

and

$$U_B = \begin{cases} R_B - D + I - I & \text{if B honours its debt,} \\ R_B - \pi + I - I & \text{if B repudiates.} \end{cases}$$

The time structure of debt finance is summarized in Figure 1.

This game is straightforward to analyse: B will repay his debt if and only if $D \leqslant \pi$. Of course, A will never grant a credit if this condition is violated. Hence debt finance is feasible only if a number D can be found such that $\pi \geqslant D \geqslant I$, which is the case if and only if

(1) $\pi \geqslant I$.

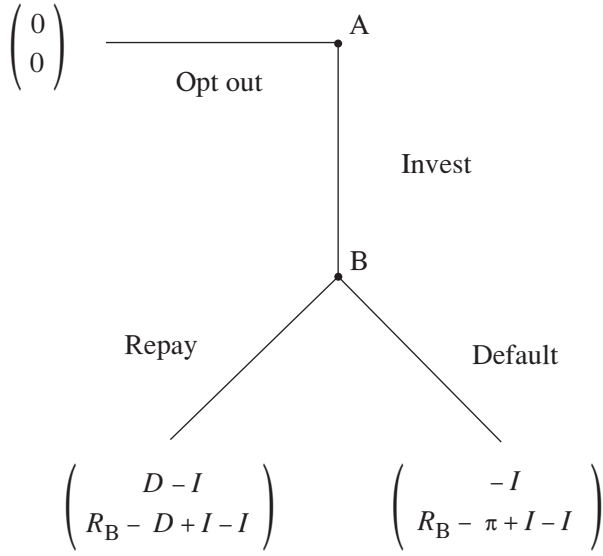

FIGURE 1. Debt finance.

Note that this condition is independent of R_B, the return generated by the investment under B-ownership. But, of course, the parties will agree to debt finance only if the joint surplus, W, that can be generated is positive, i.e. if

$$W^{\text{debt}} = U_A + U_B = R_B - I \geqslant 0. \tag{2}$$

I have assumed above that this condition is indeed fulfilled. If (1) and (2) are both satisfied, debt finance is viable. Note that, since B is cash-constrained at the time of the investment, it is not possible to share the surplus arbitrarily between the two parties because no *ex ante* side-payments from B to A are feasible. The most A can get out of this deal is $\pi - I$.

(b) Foreign direct investment

In the case of FDI, A carries out the investment project itself and is supposed to run it thereafter. However, after investment costs are sunk, B has the option to nationalize the project. Note that B is cash-constrained, so it cannot compensate A for the expropriation.[19] After nationalization B owns and controls the project and realizes the return R_B. However, as discussed in Section I, outright nationalization is very similar to debt repudiation in that it is a highly visible and unambiguous act which violates international agreements. Hence it will be punished similarly. For simplicity, let us assume that nationalization triggers the same penalty as in case of debt repudiation.[20] Thus, if A invests and B nationalizes payoffs are given by $-I$ for A and $R_B - \pi$ for B.

If B does not nationalize, it still has the option of capturing at least some of the returns from the investment by imposing taxes on A's returns from the project. In principle, the optimal tax structure may be quite complicated. However, in the very simple model considered here, we can, without loss of generality, restrict attention to the case where B chooses the total amount of taxes, T, to be paid by A. Of course, A cannot be forced to pay taxes in excess of the returns of the investment project. Hence, if T exceeds the returns, A has to pay all of the returns but not more.

As long as A is the owner of the project, it may decide to shift production from B's country to other plants abroad in response to a tax increase and to (partially) withdraw from the host country. If A does not withdraw, the project will generate a pre-tax return R_A. If A shifts production (partially) abroad, the return generated in the host country is reduced to $\underline{R}_A$, $0 \leqslant \underline{R}_A < R_A$, while an additional profit r will be received abroad.[21] The amount of this additional profit depends on many factors, in particular on possible excess capacities in other plants, on market conditions for the output good, on the internal flexibility of A and so on. It seems realistic to assume that A is better informed about these circumstances than B. We model this by assuming that, after B has chosen T, nature determines the outside option profit $r \in [\underline{r}, \bar{r}]$ according to some cumulative distribution function $F(r)$. A learns the realization of r and then decides whether to fully engage itself in B's country or to withdraw and shift some production abroad.[22]

Note that B can guarantee itself a tax of at least $\underline{R}_A$, so will never choose $T < \underline{R}_A$. Furthermore, the government will never choose $T > R_A - \underline{r}$, since this

would induce A to withdraw for sure. Using this fact, payoffs are given by

$$U_A = \begin{cases} R_A - T - I & \text{if A does not withdraw,} \\ r - I & \text{if A withdraws,} \end{cases}$$

and

$$U_B = \begin{cases} T & \text{if A does not withdraw,} \\ \underline{R}_A & \text{if A withdraws.} \end{cases}$$

The time structure of foreign direct investment is summarized in Figure 2.

Again, the game is easily solved by backwards induction. Consider the subgame in which B did not nationalize the investment project. A will not withdraw from B's country if and only if $r < R_A - T$, which happens with

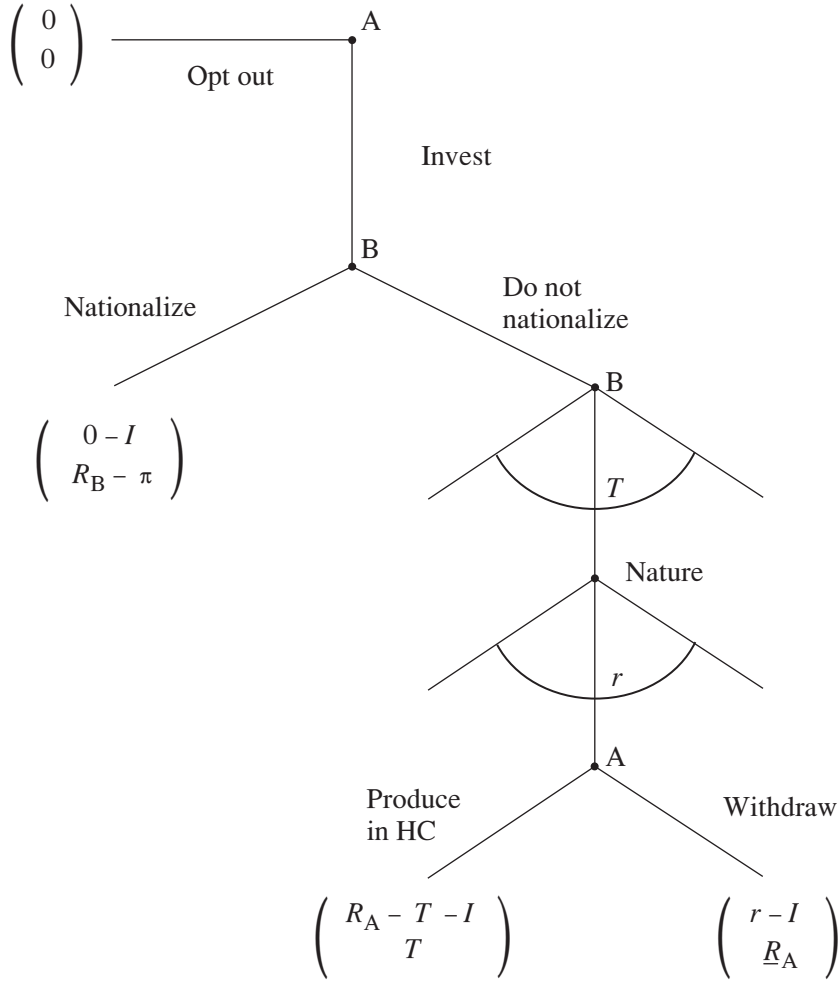

FIGURE 2. Foreign direct investment.

probability $F(R_A - T)$. Hence, B chooses the optimal tax that maximizes its payoff. For expositional convenience, we assume that there exists a unique T^* which satisfies

$$T^* = \arg\max_T \{T \cdot F(R_A - T) + \underline{R}_A \cdot [1 - F(R_A - T)]\}, \tag{3}$$

where $\underline{R}_A \leqslant T^* < R_A$. Thus, B's expected payoff in this subgame is given by

$$U_B = T^* \cdot F(R_A - T^*) + \underline{R}_A[1 - F(R_A - T^*)] \equiv T^e, \tag{4}$$

where T^* denotes the expected amount of taxes extracted from A.

Comparing (4) with B's payoff after nationalization, we see that B refrains from nationalizing the project if and only if

$$R_B - \pi < T^e. \tag{5}$$

If this condition is violated, A will never make a foreign direct investment.[23] So suppose (5) holds. Then FDI is profitable for A if and only if the MNE can cover its investment cost. Note that A's expected profit can be written as

$$\begin{aligned} U_A &= R_A \cdot F(R_A - T^*) - T^* \cdot F(R_A - T^*) - \underline{R}_A(1 - F(R_A - T^*) \\ &\quad + \int_{R_A - T^*}^{\bar{r}} (\underline{R}_A + r)\mathrm{d}F(r) - I \\ &= R_A \cdot F(R_A - T^*) + \int_{R_A - T^*}^{\bar{r}} (\underline{R}_A + r)\mathrm{d}F(r) - T^e - I. \end{aligned} \tag{6}$$

Thus, FDI is profitable for A if and only if

$$R_A \cdot F(R_A - T^*) + \int_{R_A - T^*}^{\bar{r}} (\underline{R}_A + r)\mathrm{d}F(r) - T^e \geqslant I. \tag{7}$$

Inequalities (5) and (7) are the Scylla and Charybdis of foreign direct investment. On the one hand, there is the threat of expropriation through nationalization. If the expected amount of taxes, T^e, is too small, for example because A has a strong outside option to withdraw ($\underline{R}_A$ small, expected value of r high), then B cannot be prevented from nationalizing the investment. On the other hand, there is the threat of expropriation through taxation. If T^e is too large, for example because A's outside option is weak, then B would restrain from nationalization. But in this case the project may no longer be profitable for A.

FDI is viable if (5) and (7) are both satisfied. If this is the case, the joint surplus that can be generated by financing the project through FDI is given by

$$W^{FDI} = U_A + U_B = R_A \cdot F(R_A - T^*) + \int_{R_A - T^*}^{\bar{r}} (\underline{R}_A + r)\mathrm{d}F(r) - I. \tag{8}$$

In the model described so far there will be neither default nor nationalization in equilibrium. This is due to the fact that the foreign investor perfectly anticipates the behaviour of the host country and will refrain from its investment if it expects to be expropriated. It is straightforward to introduce some noise into the model which leads to default or nationalization with

positive probability in equilibrium. Suppose, for example, that the punishment π is a random variable. Recall that π is the net present value of forgone opportunities if the country loses access to international capital markets, if trade sanctions are imposed, or if future investors refrain from foreign direct investment. Hence variations in the country's discount rate, or in the expected flow of future benefits from international trade and foreign investments, affect the amount of punishment that can be inflicted on the host country. Foreign investors form expectations about π. They will invest if the expected return from the project is sufficiently high to cover their investment costs, even if they anticipate that with some positive probability the realization of π will be so low that the country will default on its debt or nationalize the investment. Since the introduction of uncertainty on π complicates the exposition of the model without affecting our qualitative results, we stick to the model with a deterministic value of π for the comparative-static analysis.[24]

III. Efficiency and Viability of Debt Finance and FDI

The previous section stated the conditions under which either debt finance or FDI are viable; i.e. investor A can expect to cover its investment cost I. Suppose both forms of investment are viable; that is, (1), (2), (5) and (7) hold. Then, if we add a stage zero to our game where A decides about the form of investment, A will prefer debt finance to FDI if and only if

$$\pi \geqslant R_{\mathrm{A}} \cdot F(R_{\mathrm{A}} - T^{*}) + \int_{R_{\mathrm{A}} - T^{*}}^{\bar{r}} (\underline{R}_{\mathrm{A}} + r)\mathrm{d}F(r) - T^{e}, \tag{9}$$

and vice versa. Recall that the left-hand side of the inequality is A's maximum payoff in case of debt financing and the right-hand side is A's equilibrium payoff in case of FDI.

In this section we examine the efficiency of the two forms of investment and investigate how A's choice of investment relates to the efficiency of the investment. In particular, we ask if A always chooses the most efficient form. We call debt finance the more efficient form of investment if the joint surplus of A and B under debt finance is larger than their joint surplus under FDI, and vice versa. This notion of efficiency singles out the form of investment that maximizes the joint payoffs from an *ex ante* point of view, but with no possibility of committing to future actions.[25] There are two reasons why the allocation under FDI may be more efficient than under debt finance. First, the return stream generated by the multinational (R_{A}) may exceed the return stream that can be obtained by the host country itself (R_{B}). This is the case, for example, if A can employ specific skills or synergies from other activities to reduce production costs, to raise product quality or to improve marketing, and if the employment of these factors cannot be transferred from A to B through a contract. Thus, if high-technology goods or components are produced and marketed abroad, then the multinational is presumably more efficient at organizing production than the host country. On the other hand, if a standardized and rather low-tech good is produced and marketed domestically, then R_{A} and R_{B} are likely to be roughly the same. R_{B} may exceed R_{A} if B has better information about the local production and market conditions.

There is a second reason why FDI may be more efficient than debt finance. If the project is owned and controlled by the multinational it can partially shift production and profits to other countries. This may be efficiency-enhancing if the additional profits that can be obtained by producing abroad turn out to be very high (if $r > R_A - \underline{R}_A$). In this case A-control offers additional flexibility, which increases efficiency. However, A may choose to withdraw from B's country even if $r < R_A - \underline{R}_A$ because it may want to escape B's taxation. In this case the additional flexibility yields an *ex post* efficiency loss. This discussion is summarized in the following proposition.

Proposition 1. Suppose that FDI and debt finance are both viable, i.e. that (1), (2), (5) and (7) hold. FDI is more efficient than debt finance if R_A is sufficiently greater than R_B and/or if the option of withdrawing from B's country gives rise to a sufficiently strong efficiency gain.

However, if $R_A = R_B$ and if $r \leqslant R_A - \underline{R}_A$ with probability 1, then debt finance is always at least as efficient as FDI.

Note that, if debt finance is viable, if $R_A = R_B$, and if withdrawing from B's country is never profitable, then debt finance achieves the first-best. On the other hand, there is the possibility of an efficiency loss under FDI, because A may withdraw with positive probability in order to avoid taxation in B's country. This potential inefficiency is due to the fact that B cannot credibly commit itself not to expropriate A's returns by increasing taxation.

Suppose that one form of financing and running the profit is more efficient than the other. Of course, it is always possible that the project cannot be realized at all because neither debt finance nor FDI is viable. The more interesting question is whether it may happen that the more efficient form of finance is not viable, while the less efficient form is. The following proposition shows that this is impossible if debt finance is more efficient.

Proposition 2. Suppose debt finance is more efficient than FDI, and FDI is viable. Then debt finance is also viable.

Proof: see Appendix.

On the other hand, the following proposition shows that, if FDI is the more efficient way of financing the investment, it may be the case that debt is viable but FDI is not. The reason is that, even if FDI is very efficient (for example because R_A is much higher than R_B), most of these returns may be taxed away by B, so that A cannot cover its investment costs. Or it may be the case that A's outside option is very good, in which case B gets too little taxes out of the project and is induced to nationalize it.

Proposition 3. Suppose FDI is more efficient than debt finance, and debt finance is viable. Then there are cases where FDI is not viable, i.e. where the project can be realized only if the less efficient debt finance is chosen.

Proof: see Appendix.

Propositions 2 and 3 show that there is a tendency towards debt finance even if a multinational is more efficient in carrying out the project because the risks of expropriation may make foreign direct investment unsustainable. I shall now show that, even if FDI is viable and more efficient than debt finance, there may be a tendency to choose debt.

Suppose that A has a strong bargaining position, for example because it has a monopoly on the technology required for the project which could also be carried out in some other less developed country and because the output of the project is designed for the world market. In particular, A may decide which form of finance to use. The problem is that no side-payments from B to A are feasible before the investment is carried out because B is cash-constrained. Therefore, A may prefer the less efficient form of finance if this allows it to capture a higher payoff. B cannot bribe A to choose the more efficient alternative because it has no cash. The following proposition shows that this problem cannot arise if debt finance is more efficient, but it may prevail under FDI.

Proposition 4. Suppose that FDI and debt finance are both viable. If debt finance is more efficient, then A's maximum payoff under debt finance exceeds the MNE's payoff under FDI. However, if FDI is more efficient, there are cases where A's maximum payoff under debt finance will exceeds its payoff under FDI.

Proof: see Appendix.

IV. Empirical Implications

Our model predicts that, from a pure financing point of view, there is a tendency towards debt finance. Debt finance is more efficient because it avoids an inefficient withdrawal from the host country by footloose multinationals for tax reasons. It is also more likely to be viable and it allows a larger share of total surplus to be shifted to the foreign investor. FDI will be preferred to debt finance only if the returns that can be generated under the control of the multinational are sufficiently high compared with the returns that could be achieved under the control of the host country. Furthermore, the better the outside option of the multinational, the higher is the expected payoff from FDI and the more likely it is that FDI will generate sufficient returns to finance the investment.

The relative value of the investment project under different ownership regimes is affected by the type and destination of the goods to be produced. The more sophisticated the goods and the more advanced the production technologies, the more difficult it is for the host country to run production itself and to match the efficiency of a multinational. Furthermore, while it is possible to transfer the technology required to produce less sophisticated and mature goods to a less developed country through a licensing agreement, this seems to be much more difficult if high-tech products are concerned. This observation has been made in many empirical studies on FDI.[26]

Similarly, a multinational seems to be at an advantage if production is oriented towards export markets rather than towards the domestic market of

the host country. Most multinationals have world-wide marketing operations already in place; moreover, they benefit from an established brand name, and they face lower barriers to entry compared with an LDC exporter who typically has no reputation for quality and no international marketing network. On the other hand, the host country may be at an advantage if production is oriented towards the domestic market. A local producer may have superior information about local market conditions and may face lower bureaucratic barriers to entry.

The destination of goods also has a strong impact on the multinational's outside option to withdraw from the host country. If production is for the domestic market, withdrawal is not much of an option. It would be very difficult to shift production abroad and then reimport the goods to the host country without facing governmental interference (high import tariffs, etc.). In this case withdrawal can be used only to shift scarce managerial and technological resources to a more profitable use abroad. On the other hand, the threat of withdrawal may be very powerful if production is destined for export markets. An extreme case is a multinational (like a car manufacturer) that globally spreads the production of the components of its final products and has several geographically diversified plants for each component.

This seems to be consistent with the empirical evidence available on FDI. Oman (1984, pp. 47, 61), who surveys empirical studies on the financing of foreign investments, finds a clear indication that FDI tends to be much more important in export-oriented and high-technology industries in the manufacturing sector, while debt finance (and joint ventures; see also Section VI below) tends to dominate in industries that are either low-tech or oriented towards the domestic market. He also reports (pp. 56, 59) that market orientation tends to weigh more heavily than the degree of technological sophistication. This observation suggests that the threat to withdraw from the host country in reaction to excessive taxation is indeed very important in making FDI viable.

Propositions 1–4 also suggest that the threat of expropriation through nationalization is less severe in high-tech and export-oriented industries. If the multinational has a strong efficiency advantage in running the project, and if its marketing network is required to export the goods ($R_A \gg R_B$), then nationalization is not a very attractive option for the host country. This is confirmed by a cross-country study on forced divestment in 76 countries from 1960 to 1976 by Kobrin (1980). He reports that five industries account for almost half of all forced divestments in manufacturing: food products, beverages, textile and apparel, leather and footwear, and basic metals. These are industries in which technology is mature and R&D expenditures are relatively low or even unimportant. Furthermore, none of these five industries are very tightly integrated internationally. The three manufacturing industries that tend to be least vulnerable to forced divestment are drugs, chemicals and plastics, which are relatively research-intensive and globally integrated.

However, the choice between debt finance and FDI is affected not only by industry characteristics, but also by the characteristics of the host country.[27] The World Bank (1993, p. 28) reports that the FDI–debt ratio tends to increase with national income as measured by GDP per capita. This may simply reflect

the fact that countries with a higher income per capita tend to have a better educated workforce and a more reliable infrastructure, which are important requirements for the production of high-technology goods destined for export markets. However, our analysis suggests an additional explanation for this phenomenon. Countries with a higher income tend to suffer more from the punishments in the case of debt repudiation or forced divestment, so the threat of outright expropriation is less severe. Hence the scenario described in Proposition 3, where debt finance is viable while FDI is not viable even though it is the more efficient form of investment, is less likely to occur. Thus, one would expect to observe more FDI than debt finance if the host country is less credit-constrained.

V. Strategic *v.* Liquidity Default

The previous sections have shown that there is a clear tendency towards debt finance. In this section we consider a variant of the model in which returns are stochastic. Most of our previous results carry over if the realizations of these returns are observable by international capital markets. However, if these returns are not observable, the punishment in case of debt repudiation cannot distinguish between strategic default (the debtor country could repay the debt but is unwilling to do so) and liquidity default (the debtor would like to repay but is unable to do so because the return is too small and the country is liquidity-constrained). This yields an additional inefficiency in the case of debt finance which is the more severe the more risky is the investment project.

To illustrate this problem, consider the following modification of our basic model. The return generated by the investment if it is controlled by A (B) is stochastic and is given by $\overline{R}_A$ ($\overline{R}_B$) with probability q and 0 with probability $1-q$. Assume that the expected returns are just the same as in the deterministic model; i.e.

$$q\overline{R}_A = R_A,$$
$$q\overline{R}_B = R_B.$$

Keeping expected returns constant, the investment project is more risky the smaller is q (and the higher $\overline{R}_A$, $\overline{R}_B$, respectively).

The realization of the return stream is drawn by nature when production is carried out in the host country, i.e. after A has decided on whether or not to withdraw from the host country, but before B has to decide whether to repay its debt. For simplicity, we assume that if A decides to withdraw, its return in the host country is still deterministic and is given by $\underline{R}_A$.

The analysis of foreign direct investment is basically unchanged. Nature determines the realization of the return after all relevant decisions have been taken. Since all parties are risk-neutral, only expected returns matter. The actual amount of taxes to be paid by A if its investment succeeds will be higher, but the MNE cannot be forced to pay taxes if returns are 0. The expected tax rate is just the same as in the deterministic model.[28]

The analysis of debt finance depends on whether or not B's return from running the project is observable by international capital markets. The time structure of debt finance with stochastic returns is depicted in Figure 3.

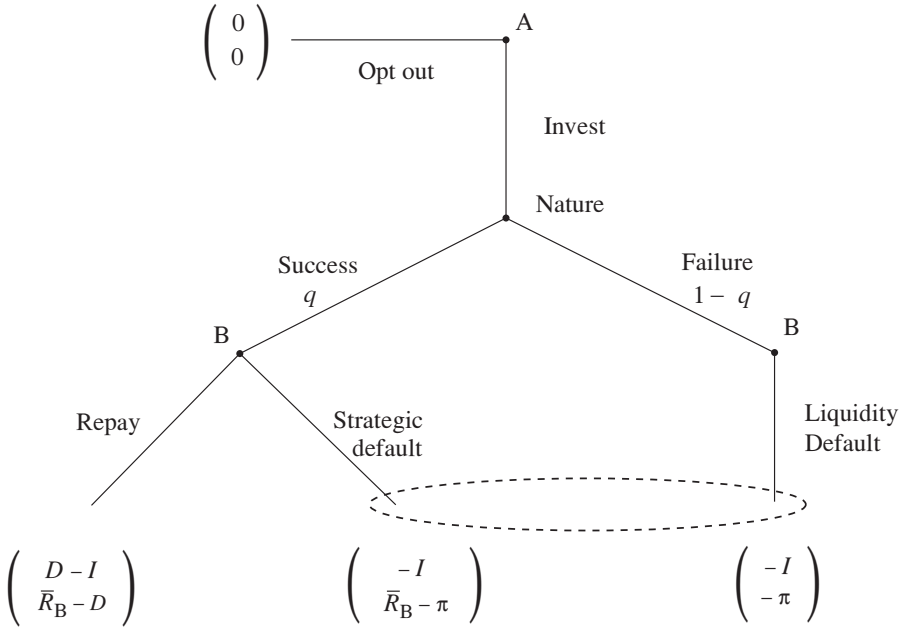

FIGURE 3. Debt finance with strategic and liquidity default.

Suppose first that the return generated by the investment if B is in control is publicly observable. In this case B should be punished after strategic default but not after liquidity default. If the project fails, a liquidity default cannot be deterred anyway, so the deadweight loss π should be avoided. B will choose to default strategically if $D > \pi$, so its repayment is bounded above by π. Furthermore, the government can repay only if the project is successful. Thus, A will finance the project by offering a credit to B only if

$$q\pi \geqslant I. \tag{10}$$

Comparing (10) with (1) in the deterministic case, it is more difficult to employ debt finance the more risky the project (the lower q).

Suppose now that the return generated by the investment if B is in control is private information of B. In this case international capital markets cannot distinguish strategic default from liquidity default and the same punishment has to be applied in both cases. Suppose that $D \leqslant \pi$ and $qD \geqslant I$ (otherwise A would not offer a credit to finance the investment). Then B's expected payoff from debt finance is given by

$$U_B = q(\overline{R}_B - D) - (1 - q)\pi. \tag{11}$$

This expression has to be positive, otherwise B is not going to participate. This condition puts an upper bound on the level of D:

$$D \leqslant \overline{R}_B - \frac{1 - q}{q}\,\pi. \tag{12}$$

Hence the maximum payoff that A can obtain with debt finance is given by

$$(13) \qquad U_{\mathrm{A}}^{\max}(\text{debt}) = \min\left\{ \pi, \overline{R}_{\mathrm{B}} - \frac{1-q}{q}\,\pi \right\},$$

which is decreasing with the riskiness of the project (increasing with q).

Finally, the project will be undertaken only if

$$(14) \qquad W^{\text{debt}} = U_{\mathrm{A}} + U_{\mathrm{B}} = q\overline{R}_{\mathrm{B}} - I - (1-q)\pi = R_{\mathrm{B}} - I - (1-q)\pi \geqslant 0.$$

Comparing this with (2) in Section II(a), the expected net surplus, $R_{\mathrm{B}} - I$, has to be sufficient to cover the deadweight loss of the inefficient punishment in case of liquidity default. Hence, the riskier the project, the less profitable is debt finance. The analysis is summarized in the following proposition.

Proposition 5. An increase in the riskiness of the investment project does not affect foreign direct investment but reduces the prospects of debt finance.

(a) A decrease in q, keeping the expected return $R_{\mathrm{B}} = q\overline{R}_{\mathrm{B}}$ constant, reduces $q\pi$ which is the maximum amount A is prepared to lend. Hence an increase in the riskiness may render debt finance unviable.
(b) If international capital markets cannot distinguish strategic default from liquidity default, an inefficient punishment has to be incurred by B with probability $1 - q$ which reduces A's maximum payoff and the total surplus from debt finance. An increase in riskiness increases the expected amount of this deadweight loss and may render debt finance unprofitable.

As Proposition 5 shows, stochastic returns affect B's incentive to behave opportunistically in each of the two investment forms in different ways. The reason is that in the case of debt finance the decision to repudiate is taken after production takes place and returns from the project are realized, whereas in case of FDI the decision to nationalize is taken before production takes place and returns are realized. Note further that the inefficiencies of debt finance caused by the riskiness of the investment project arise even though both parties are risk-neutral. They are due to B's liquidity constraint and the inability of international capital markets to distinguish strategic default from liquidity default. Typically, the production of high-technology goods destined for export markets is more risky than the production of mature goods or goods produced for the domestic market. Hence the effect described in this section confirms my empirical hypothesis that FDI has a comparative advantage in the former industries.

VI. Joint Ventures

If a multinational enterprise engages in foreign direct investment in a less developed or Eastern European country, it is often observed that this is done by forming a joint venture with a local firm, often a state-owned company of the host country. Sometimes the multinational is forced to give away some share of the project without adequate compensation, in which case this

arrangement is nothing but a disguised form of expropriation. In the model of Section II, expropriating a share of the return stream by forcing the multinational into a joint venture is equivalent to imposing a tax.

However, there are circumstances in which a joint venture can be efficiency-improving and where the multinational will agree to it voluntarily. In order to show this, we have to consider a variant of our basic model of foreign direct investment.

The basic version of the model focused on the case of footloose multinationals. There is, however, a complementary mechanism which restricts taxation of the host country and which works even if there is no possibility of shifting production abroad. Suppose that during the production stage, i.e. after the initial investment has been made, the owner of the project has to engage in additional actions which affect the profitability of the project. For example, it may have to decide on the level of complementary investments in training for local workers and managers, in upgrading the existing technology, in infrastructure or in marketing of the goods to be produced.

The host country has the option of expropriating the entire return stream through expropriation. However, high taxes will reduce the incentives of the multinational to further invest into the project and thus will reduce the expected value of the return stream. Therefore, the host country will limit its taxes and impose a rent on the multinational in order to induce a higher investment in the second stage. I will show that, if the multinational and the host country engage in a joint venture, then this will further reduce HC's incentives to tax, which in turn will lead to an efficiency improvement.

To be more precise, consider the subgame after the initial investment has been made and after B has decided not to nationalize the project. B may now decide on the tax to be imposed on the project. Thereafter A has to decide on the level of further investment or effort to put in. The return on the project is stochastic and may be either $\overline{R}_A$ or 0. A's effort affects the probability of success. Without loss of generality, we assume that A chooses the probability of success, $q \in [0, 1]$, directly at cost $K(q)$. $K(q)$ is increasing and strictly convex with $K'(0) = 0$ and $\lim_{q \to 1} K(q) = \infty$. The last assumption implies that, for q sufficiently close to 1, $K'''(q) > 0$. In order to guarantee a unique solution of the following maximization problems, we assume that $K'''(q) > 0$ for all $q \in (0, 1)$.

Suppose now that A and B engage in a joint venture after the initial investment has been sunk. B receives some share $1 - \alpha$ of the project's net profits; A gets the remainder of profits and is left with the control rights on the project, so the MNE can choose the level of investment at its discretion. Note that we assume that B shares not only the revenues but also the costs from the subsequent investment. A significant part of these costs will be in local currency, for example the costs of complementary investments in infrastructure or for training local workers. Thus, B could share these costs even if it has no access to international capital markets and hard currency. In a first step we take α to be exogenously given. The time structure of this game is summarized in Figure 4.

Consider A's decision on how much to invest in the second stage of the project. A maximizes

$$U_A = q\alpha(\overline{R}_A - T - K(q)) - (1 - q)\alpha K(q) - I. \tag{15}$$

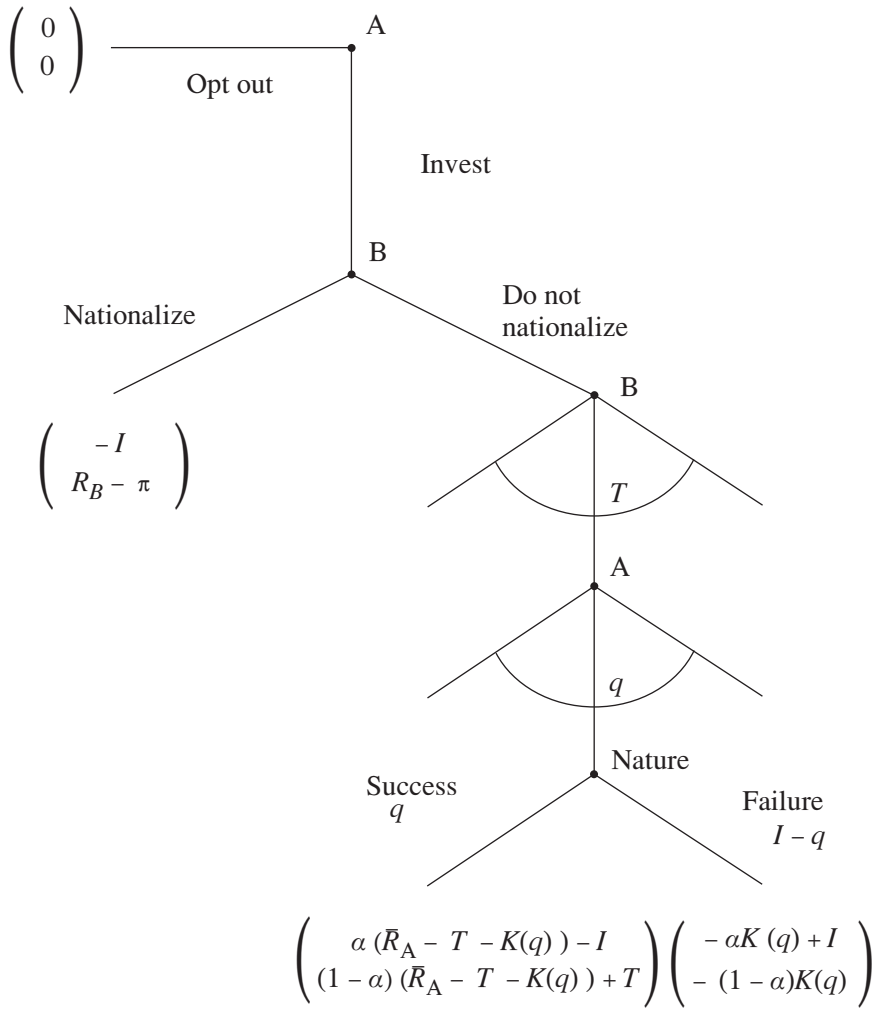

FIGURE 4. FDI with joint venture.

Given the assumptions on $K(q)$ the optimal level of q is uniquely characterized by the following first-order condition:

$$K'(q^*) = \overline{R}_A - T. \tag{16}$$

Note that $q^*(T)$ is a continuous and strictly decreasing function of T for all $T \in (0, \overline{R}_A)$. Note further, that it does not depend directly on α, A's share of net profits.

When B decides on the level of taxes to be imposed on the project, it takes the effect of T on q^* and thus on its own share of net profits into account. B maximizes

$$U_B = q^*(T)\{(1-\alpha)[\overline{R}_A - T - K(q^*(T))] + T\} - (1 - q^*(T))(1-\alpha)K(q^*(T)). \tag{17}$$

In the Appendix I prove that B's maximization problem has a unique interior solution $T^*(\alpha) \in (0, \overline{R}_A)$ (Lemma 1). Since $T^*(\alpha) \in (0, \overline{R}_A)$, it must satisfy the following first-order condition:

$$\frac{dq^*(T)}{dT} T + \alpha q^*(T) = 0. \tag{18}$$

Using the implicit function theorem again, it is straightforward to show that

$$\frac{dT^*}{d\alpha} = - \frac{q^*(T)}{- \dfrac{K''' T}{[K''(q^*(T))]^3} + (1+\alpha) \dfrac{dq^*(T)}{dT}} > 0. \tag{19}$$

The denominator is negative, so $T^*(\alpha)$ is strictly increasing with α. This result is very intuitive. The lower is α, the higher is the share of profits that goes directly to B. Hence B will restrict the amount of taxes to be imposed on the project in order to increase the expected profits earned in the joint venture. Note that, even if $\alpha = 1$ (A gets all of the net profits), B will choose $T^*(1) < \overline{R}_A$; i.e., it will leave some rent to A in order to induce a positive q.

The following proposition summarizes the effect of α on total surplus and on the payoffs of both players:

Proposition 6. A decrease of A's share, α, of net profits reduces the optimal tax rate $T^*(\alpha)$ and increases the efficiency of the project. B's payoff is strictly increasing as α decreases. The effect of a reduction of α on A's payoff is ambiguous. For large values of α, A may benefit from giving up some share of the project to B.

Proof: see Appendix.

Proposition 6 indicates two rationales for joint ventures. First, A may benefit directly from giving some share of net profits to B. This would induce B to impose lower taxes on the project, which would increase overall efficiency and might increase A's payoff directly.

However, there is a second rationale for joint ventures. Foreign direct investment is viable only if there is no temptation for B to nationalize the project. That is, B's payoff from nationalization must not exceed its payoff from leaving A in control of the project and taxing it:

$$R_B - \pi \leqslant q^*[(1-\alpha)(\overline{R}_A - T^* - K(q^*)) + T^*] - (1-q^*)(1-\alpha)K(q^*). \tag{20}$$

Giving B a share in the project increases the right-hand side of this inequality and makes it less likely that B will nationalize the project. But, of course, the project has to be sufficiently profitable that A can still recover its initial investment costs I.

The empirical evidence suggests that the risk of forced divestment is indeed much lower if the multinational engages in a joint venture with a local partner in the host country (see Kobrin 1980, p. 82). Furthermore, Caves (1982) and Reuber (1973, pp. 82–7) report that export-oriented investment projects are

more likely to be wholly owned by a multinational than by domestic market-oriented firms which are frequently run as joint ventures with local partners. This observation is consistent with the present model, which suggests that if production is destined for the domestic market the risk of nationalization is particularly high, and hence B should be given shares in the firm as a safeguard against forced divestment. Furthermore, the threat of withdrawal from the host country is not sufficient to deter the host country from excessive taxation. Thus, a joint venture may be used to mitigate the problem of creeping expropriation through taxation.

VII. Conclusions

The paper has shown that the sovereign risks associated with debt finance are generally less severe than the ones that come with FDI. If the return streams that can be generated under the control of the host country and the foreign direct investor are the same and are not too risky, then debt finance will tend to be more efficient and is more likely to be viable, and it will enable a larger share of the surplus to be given to the foreign investor. However, FDI will be the preferred mode of capital transfer if the foreign investor is more efficient in running the project, if the project is risky, and if the foreign investor has a good outside option which deters creeping expropriation. Furthermore, it has been shown that the host country and the foreign investor may benefit from forming a joint venture. The theory developed in this paper seems to be consistent with the empirical evidence from developing countries that is available so far.

There are several theoretical questions raised in this paper which deserve further attention. In particular, I used a rather crude static model of foreign direct investment. In a companion paper (Schnitzer 1999) I set up a dynamic model of FDI which gives room for implicit contracts between the host country and the foreign investor. This paper confirms several of the results obtained in the static framework and offers many new insights. In particular, it gives a much richer picture on how cooperation may be sustained, it shows that sovereign risk may induce over- as well as underinvestment, and it offers a framework in which frequently observed phenomena such as tax holidays for FDI can be discussed.

The relevance of the issues discussed in this paper seems to be supported by the pattern of FDI flows to developing countries. Such flows increased in the 1960s and 1970s, reaching a record high in 1981; but they declined at the beginning of the 1980s, at the onset of the debt crisis. The threat of adverse host country behaviour has been cited as one of the causes for the decline in direct investments in the 1980s. This runs counter to the argument set out in the introduction that FDI would substitute for international credits in times of financial crisis.[29] And indeed, the wave of nationalizations in the 1960s and 1970s was evidence that, just like credit flows, FDI flows are subject to sovereign risk. Parallel to nationalizations, the 1970s saw an increase in taxation, as the governments of developing countries acquired the administrative, managerial and technical capabilities to extract gains from foreign firms through taxation (Andersson 1991). Since the 1980s the number of nationalizations has declined substantially. Among the reasons given for this decline are that multinational firms have learned from experience and either no

longer set up vulnerable investment projects in developing countries, or make an effort to protect themselves by making their subsidiaries more dependent on the parent companies, an effect that is much documented. It is also argued that developing countries have learned to rely more on taxation as opposed to nationalization to capture the rents from foreign investments.[30]

The last decade has seen a liberalization of foreign investment regimes, most notably in the transition economies in Eastern Europe but also in other developing countries, under the encouragement by international organizations, and FDI flows have increased again. At the same time, these new investment opportunities have renewed concerns about how to safeguard direct investments against outright and creeping expropriation. The present analysis can throw some light on the question of why some transition economies in Eastern Europe have been so much more successful in attracting foreign capital than others. The political risks faced by foreign investors differs substantially across different countries. One important issue that determines the riskiness of investing is the legal framework in each country to protect foreign investors against creeping expropriation or nationalization without compensation. Another major factor is the political stability of a country and the risk of renationalization. To test the impact of these different issues formally on investment decisions, it would be necessary to have less aggregated data on FDI, in particular on the types of goods produced, the market orientation of these goods and the outside options of the foreign investors, but also on host country characteristics (such as indebtedness, creditworthiness and expropriation record) and on the types of contract employed (joint ventures, and other new forms of international investments). This is the subject of a current research project in which colleagues and I are investigating the characteristics of foreign direct investment in Eastern Europe.

APPENDIX

Proof of Proposition 2

Debt is more efficient than FDI if and only if

$$\text{(A1)} \qquad R_B > R_A \cdot F(R_A - T^*) + \int_{R_A - T^*}^{\bar{r}} (\underline{R}_A + r)\mathrm{d}F(r) - I.$$

Suppose that FDI is viable, i.e. that (5) and (7) hold. We want to show that debt too must be viable, i.e. that (1) and (2) hold. Note first that, since $T^e \geqslant 0$, (7) implies that

$$\text{(A2)} \qquad R_A \cdot F(R_A - T^*) + \int_{R_A - T^*}^{\bar{r}} (\underline{R}_A + r)\mathrm{d}F(r) \geqslant I.$$

Hence, (A1) implies (2). Second,

$$\text{(A3)} \qquad \pi > R_B - T^e \geqslant R_B - \left[R_A \cdot F(R_A - T^*) + \int_{R_A - T^*}^{\bar{r}} (\underline{R}_A + r)\mathrm{d}F(r) - I \right]$$

$$= R_B - \left[R_A \cdot F(R_A - T^*) + \int_{R_A - T^*}^{\bar{r}} \underline{R}_A + r)\mathrm{d}F(r) \right] + I > I.$$

The first inequality follows from (5), the second from (7), and the third from (A1). But (A3) implies (1). □

Proof of Proposition 3

The proof is by example. Suppose that r is uniformly distributed on $[0, \overline{r}]$, $\underline{R}_A = 0$, and $\overline{r} > R_A/2$. Consider the subgame after B decides not to nationalize. It is a simple exercise to compute the optimal tax $T^* = R_A/2$, the expected tax $T^e = R_A^2/4\overline{r} = U_B$, A's expected payoff $U_A = (R_A^2/8\overline{r}) + (\overline{r}/2) - I$ and the joint surplus $W^{FDI} = (3R_A^2/8\overline{r}) + (\overline{r}/2) - I$. FDI is more efficient than debt finance if and only if

$$\text{(A4)} \qquad \frac{3R_A^2}{8\overline{r}} + \frac{\overline{r}}{2} - I > R_B - I.$$

Debt is viable if (1) and (2) hold. I want to show that there are parameter constellations such that either

$$\text{(A5)} \qquad R_B - \pi > \frac{R_A^2}{4\overline{r}},$$

which corresponds to a violation of (5), or

$$\text{(A6)} \qquad \frac{R_A^2}{8\overline{r}} + \frac{\overline{r}}{2} < I,$$

i.e. that (7) does not hold.

To see that (A5) is possible, set $\pi = I$ and

$$\text{(A7)} \qquad R_B = \frac{R_A^2}{4\overline{r}} + I + \varepsilon,$$

where $\varepsilon > 0$ is small. Then $\pi \geqslant I$ and $R_B \geqslant I$, so debt finance is viable. Furthermore, (A5) holds, so FDI is not viable. Finally, (A4) is satisfied too, if

$$\text{(A8)} \qquad \frac{3R_A^2}{8\overline{r}} + \frac{\overline{r}}{2} > \frac{R_A^2}{4\overline{r}} + I + \varepsilon,$$

which is equivalent to

$$\text{(A9)} \qquad \frac{R_A^2}{8\overline{r}} + \frac{\overline{r}}{2} > I + \varepsilon,$$

which is the case if I is sufficiently small.

To show that (A6) is possible, set $\pi = R_B = I$. Thus (1) and (2) hold. (A4) and (A6) hold if and only if

$$\text{(A10)} \qquad \frac{3R_A^2}{8\overline{r}} + \frac{\overline{r}}{2} > I > \frac{R_A^2}{8\overline{r}} + \frac{\overline{r}}{2}.$$

Since $3R_A^2/8\overline{r} > R_A^2/8\overline{r}$, such values for I exist. □

Proof of Proposition 4

A's maximum payoff under debt finance is

$$\text{(A11)} \qquad U_A^{\max}(\text{debt}) = \min\{R_B, \pi\} - I,$$

while its payoff under FDI is given by

$$(A12)\quad U_A(FDI) = R_A \cdot F(R_A - T^*) + \int_{R_A - T^*}^{\bar{r}} (\underline{R}_A + r)\mathrm{d}F(r) - T^e - I.$$

Suppose debt finance is more efficient, i.e.

$$(A13)\quad R_B - I > R_A \cdot F(R_A - T^*) + \int_{R_A - T^*}^{\bar{r}} (\underline{R}_A + r)\mathrm{d}F(r) - I,$$

and suppose that FDI is viable, i.e.

$$(A14)\quad R_B - \pi < T^e.$$

Then we have

$$\begin{aligned}(A15)\quad U_A^{\max}(\text{debt}) &= \min\{R_B, \pi\} - I > R_B - T^e - I \\ &> R_A \cdot F(R_A - T^*) + \int_{R_A - T^*}^{\bar{r}} (\underline{R}_A + r)\mathrm{d}F(r) - T^e - I \\ &= U_A(FDI),\end{aligned}$$

where the first inequality follows from (A14) and the second from (A13).

Suppose now that FDI is more efficient. Again, an example shows that it may be the case that $U_A^{\max}(\text{debt}) > U_A(FDI)$. Consider the example given in the proof of Proposition 3. FDI is more efficient than debt finance iff

$$(A16)\quad \frac{3R_A^2}{8\bar{r}} + \frac{\bar{r}}{2} - I > R_B - I.$$

Consider parameters such that $\pi = R_B > I$ and $U_A(FDI) = (R_A^2/8\bar{r}) + (\bar{r}/2) - I > 0$. This ensures that FDI and debt are both viable. I want to show that it is possible that

$$(A17)\quad U_A(FDI) = \frac{R_A^2}{8\bar{r}} + \frac{\bar{r}}{2} - I < R_B - I = U_A^{\max}(\text{debt}).$$

Inequalities (A16) and (A17) can both be satisfied if

$$(A18)\quad \frac{3R_A^2}{8\bar{r}} + \frac{\bar{r}}{2} > R_B > \frac{R_A^2}{8\bar{r}} + \frac{\bar{r}}{2}.$$

Given that the RHS of this inequality is greater than I, it is not difficult to find parameter values for R_B, such that $R_B > I$ and (A18) both hold. □

Lemma 1. For any $\alpha \in (0, 1)$, B's maximization problem has a unique interior solution $T^*(\alpha) \in (0, \overline{R}_A)$.

Proof. I first show that B's payoff function is strictly concave in T. By the implicit function theorem, $\mathrm{d}q^*(T)/\mathrm{d}T = -(1/K''(q^*)) < 0$. Differentiating U_B with respect to T, we get

$$\begin{aligned}(A19)\quad \frac{\mathrm{d}U_B}{\mathrm{d}T} &= \frac{\mathrm{d}q^*(T)}{\mathrm{d}T}\left((1-\alpha)\underbrace{[\overline{R}_A - T - K'(q^*(T))]}_{=0,\text{ by env. theorem}} + T\right) + \alpha q^*(T) \\ &= -\frac{T}{K''(q^*(T))} + \alpha q^*(T)\end{aligned}$$

and

$$\text{(A20)}\quad \frac{\mathrm{d}^2 U_{\mathrm{B}}}{\mathrm{d}T^2} = -\frac{K''(q^*(T)) - TK'''(q^*(T))(\mathrm{d}q^*(T)/\mathrm{d}T)}{[K''(q^*(T))]^2} + \alpha \frac{\mathrm{d}q^*(T)}{\mathrm{d}T}$$

$$= \underbrace{-\frac{1}{K''(q^*(T))}}_{<0} + \underbrace{\frac{TK'''(q^*(T))(\mathrm{d}q^*(T)/\mathrm{d}T)}{[K''(q^*(T))]^2}}_{\leqslant 0} + \underbrace{\alpha \frac{\mathrm{d}q^*(T)}{\mathrm{d}T}}_{<0} < 0.$$

The second term is non-positive because $K'''(q) \geqslant 0$. Hence the optimal $T^*(\alpha)$ must be unique. Furthermore, it is never optimal to choose $T \geqslant \overline{R}_{\mathrm{A}}$, because this would imply that $q^*(T) = 0$ and $U_{\mathrm{B}} = 0$, while a strictly positive payoff can be obtained by choosing $T < \overline{R}_{\mathrm{A}}$. Finally, it cannot be optimal to choose $T = 0$. To see this, note that at $T = 0$ $q^*(T) > 0$. Therefore

$$\text{(A21)}\quad \left.\frac{\mathrm{d}U_{\mathrm{B}}}{\mathrm{d}T}\right|_{T=0} = -\frac{T}{K''(q^*(T))} + \alpha q^*(T) = \alpha q^*(0) > 0.$$

Hence, if $\alpha > 0$, a strictly higher payoff can be obtained by choosing $T > 0$. □

Proof of Proposition 6

We have shown already that $\mathrm{d}T^*(\alpha)/\mathrm{d}\alpha > 0$. Differentiating U_{B} and U_{A} with respect to α, we get

$$\text{(A22)}\quad \frac{\mathrm{d}U_{\mathrm{B}}}{\mathrm{d}\alpha} = \frac{\mathrm{d}q^*}{\mathrm{d}T}\frac{\mathrm{d}T^*}{\mathrm{d}\alpha}\left((1-\alpha)\underbrace{(\overline{R}_{\mathrm{A}} - T^* - K'(q^*))}_{=0 \text{ by env. theorem}} + T^*\right)$$

$$+ q^*\left(-\overline{R}_{\mathrm{A}} + T^* + \alpha\frac{\mathrm{d}T^*}{\mathrm{d}\alpha}\right) + K(q^*)$$

$$= K(q^*) - q^*(\overline{R}_{\mathrm{A}} - T) + \frac{\mathrm{d}T^*}{\mathrm{d}\alpha}\underbrace{\left(\alpha q^* + \frac{\mathrm{d}q^*}{\mathrm{d}T}T^*\right)}_{=0 \text{ by env. theorem}}$$

$$= K(q^*) - q^*(\overline{R}_{\mathrm{A}} - T^*) < 0.$$

The last inequality follows from the fact that $q^*(\overline{R}_{\mathrm{A}} - T^*) - K(q^*)$ is the net profit of the project, which must be positive at the optimum. Otherwise A should have choosen $q = 0$.

$$\text{(A23)}\quad \frac{\mathrm{d}U_{\mathrm{A}}}{\mathrm{d}\alpha} = \frac{\mathrm{d}q^*}{\mathrm{d}T}\frac{\mathrm{d}T^*}{\mathrm{d}\alpha}\left(\alpha\underbrace{(\overline{R}_{\mathrm{A}} - T^* - K'(q^*))}_{=0 \text{ by env. theorem}}\right) + q^*\left(\overline{R}_{\mathrm{A}} - T^* - \alpha\frac{\mathrm{d}T^*}{\mathrm{d}\alpha}\right) - K(q^*)$$

$$= \underbrace{q^*(\overline{R}_{\mathrm{A}} - T^*) - K(q^*)}_{>0} - \underbrace{\alpha q^*\frac{\mathrm{d}T^*}{\mathrm{d}\alpha}}_{>0}.$$

Thus, the impact of α on A's payoff may be ambiguous. A marginal increase of α increases A's share of the total net payoff, $q^*(\overline{R}_{\mathrm{A}} - T^*) - K(q^*)$. On the other hand, a marginal increase of α induces B to increase total taxes by $\mathrm{d}T^*/\mathrm{d}\alpha$, of which A has to pay its share α. The increase in taxation is relevant only if the project was successful (which happens with probability q^*. If α is close enough to 0, the second effect vanishes

and A always prefers to increase α. However, if α is sufficiently large, the second effect may dominate. The effect of a change of α on total surplus is given by

$$(24) \qquad \frac{\mathrm{d}(U_A + U_B)}{\mathrm{d}\alpha} = -\alpha q^* \frac{\mathrm{d}T^*}{\mathrm{d}\alpha} < 0. \qquad \square$$

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NOTES

1. See World Bank (1997).
2. Janeba (2000, 2001) analyses the multinational firm's incentive to hold excess capacity in other countries as a means of changing the contracting problem between firm and host government.
3. Another important strand of literature on FDI not relevant for this discussion deals with FDI as an alternative to exporting: see e.g. Smith (1987), Rowthorn (1992), Motta (1992).
4. Horstmann and Markusen (1987) offer a game-theoretic model of this approach. They consider a technology supplier who has a reputation for his product. He may prefer FDI to licensing because a potential licensee does not have the same incentive to maintain this reputation. Since the technology is high-tech, it is impossible to fully specify all the relevant actions of the licensee.
5. For recent surveys on the sovereign debt problem, see Eaton (1993) and Eaton and Fernandez (1995).
6. The only theoretical model I am aware of that makes this distinction is Raff (1992). However, in his model the government can commit to tax rates before investment costs are sunk, so there is no hold-up problem. Raff develops an asymmetric information model in order to assess the likelihood of nationalization.
7. Without loss of generality, we restrict attention to the case where any credit is directly given by the MNE rather than by a third party such as a bank.
8. The debt crisis in the early 1980s and the recent developments in Mexico demonstrate again that default is a very serious problem for international lending; see Eichengreen and Portes (1986) for a historical survey on foreign lending and default since the 1920s.
9. For explicit models of the costs of default, see e.g. Eaton and Gersovitz (1981) and Bulow and Rogoff (1989a).
10. Williams (1975) collected similar data for the period 1956–72. He reports that 11.1% of all FDIs in less developed countries were expropriated without compensation; see also Andersson (1991).
11. I discuss this development more extensively in the Conclusion.
12. See Vernon (1971).
13. For a survey see Kobrin (1987).
14. Many studies of multinational enterprises emphasize the observation that these firms are 'footloose'; see e.g. Caves (1982, p. 255) and the examples given there.
15. Note that this outside option includes the option of investing and producing somewhere else. The payoff from doing so is normalized to zero, whereas the returns from investing in country B are assumed to be positive. This is what makes the investment in B's country attractive in the first place.
16. The typical case is that the capital outlay I is used to buy machinery and other equipment on the world market which can be organized or financed directly by A.
17. The case of stochastic returns will be analysed in Section V.
18. The assumption that there is no renegotiation is made for simplicity only. The issue of sovereign debt renegotiation is discussed e.g. by Bulow and Rogoff (1989b) and Fernandez and Rosenthal (1990). It would be desirable to allow for renegotiation in this model as well, but this would considerably complicate the analysis. However, if the renegotiation process does not always yield the *ex post* efficient outcome (e.g. because there is bargaining under asymmetric information—see Section V below), then the payoffs assumed here could be interpreted as the reduced-form payoffs of the renegotiation game. Modelling the renegotiation process explicitly has to be left to future research.
19. If B nationalizes now and defers compensation until after the returns of the project are realized, we are back to the case of debt finance considered above.
20. Eaton and Gersovitz (1983, pp. 89–90) argue that the punishment in case of nationalization is typically less severe compared with the punishment after debt repudiation, in particular if the

host country does not nationalize foreign direct investments on a large scale but rather, selectively. In this case potential future investors may not refrain from investing in the host country because they consider the past nationalization record not to be relevant for their own investment projects. On the other hand, nationalization without paying adequate compensation clearly is a hostile act of the host country, while the host country may have been forced to repudiate its debt owing to liquidity constraints. This argument suggests that there is less scope to renegotiate the punishment in case of nationalization. See also the discussion in Section V. An extension of the model in which the two penalties differ is straightforward and left to the reader.

21. Note that, since A is still in control of the project, it realizes a payoff $r > 0$, i.e. a payoff that is larger than its outside option utility if it has never invested in B's country in the first place or if it has done so but has lost control of the assets because of nationalization. One example how A may benefit from its control of the assets is that it can in fact transfer some of the assets and hence, if the MNE decides to relocate production, does not need to invest as much as if it had started from scratch. Another example how A might shift profits abroad is that it shifts part of the production process, e.g. the production of input goods, abroad and buys them at an overvalued price for the production of final goods in country B. Alternatively, A could shift the production of final goods to another country and deliver input goods produced in B's country at an undervalued price to this other country.
22. An interesting question is how the choice of FDI *v*. debt would be affected if A knew about r before deciding about the investment mode. In particular, one might wonder whether A with its choice of FDI *v*. debt financing could provide a signal to B about the value of r. However, since the realization of r affects A's payoff only if the MNE expects to withdraw in equilibrium, such a fully separating equilibrium cannot exist if B prefers nationalization to capturing the minimum tax revenue in case of withdrawal.
23. Note that, in both FDI and debt finance, the returns to B from nationalizing and from debt repudiation are the same, i.e. $R_B - \pi$. Despite that, it is possible that in case of debt finance B would opt for repudiation whereas in case of FDI B would refrain from nationalization. The reason is that, in the case of FDI, B can choose between taxation and nationalization. As indicated by condition (5), B's payoff from taxation may be higher than its payoff from nationalization if the project generates a higher return under A's control than under B's control and if A's threat of withdrawing from B's country is not sufficient to prevent substantial taxation.
24. However, in Section V we consider the case of stochastic returns to the investment, which affects debt finance and FDI differently.
25. This means that this concept does not capture first-best efficiency, since it builds in the relocation decision taken by A, which is taken too often relative to the first-best.
26. For a detailed discussion of this point see Caves (1982, p. 200 ff.).
27. Oman (1984, p. 48) claims that 'industry specific factors tend to be outweighed by others, particularly those which are host country specific'. Unfortunately, however, he does not offer any systematic evaluation of these additional factors.
28. What happens if A knows the realization of the return stream before it decides on withdrawal? In this case A benefits from the riskiness of the project because it can shift production abroad if it expects returns in the host country to be low and can stay if returns are expected to be high. This effect reinforces the main conclusion of this section, that risky returns make FDI more attractive.
29. Before the 1960s there were few nationalizations, partly because of fierce responses from the leading capital exporters whenever foreign property rights were violated, and partly because developing countries acquired the capability to run the foreign projects themselves only gradually (Andersson 1991).
30. For a critical discussion of these arguments see Andersson (1991).

REFERENCES

ANDERSSON, T. (1991). *Multinational Investment in Developing Countries: A Study of Taxation and Nationalization*. London and New York: Routledge.

BULOW, J. and ROGOFF, K. (1989a). Sovereign debt: is to forgive to forget? *American Economic Review*, **79**, 43–50.

—— and —— (1989b). A constant recontracting model of sovereign debt. *Journal of Political Economy*, **97**, 155–78.

CAVES, R. E. (1982). *Multinational Enterprise and Economic Analysis*. Cambridge: Cambridge University Press.

DUNNING, J. H. (1981). *International Production and the Multinational Enterprise*. London: George Allen & Unwin.

EATON, J. (1993). Sovereign debt: a primer. *World Bank Economic Review*, **7**, 137–72.
—— and FERNANDEZ, R. (1995). Sovereign debt. In G. M. Grossman and K. S. Rogoff (eds.), *Handbook of International Economics*. Amsterdam: North-Holland, pp. 2031–77.
—— and GERSOVITZ, M. (1981). Debt with potential repudiation: theoretical and empirical analysis. *Review of Economic Studies*, **48**, 289–309.
—— and —— (1983). Country risk: economic aspects. In R. J. Herring (ed.), *Managing International Risk*. Cambridge: Cambridge University Press, pp. 75–108.
—— and —— (1984). A theory of expropriation and deviations from perfect capital mobility. *Economic Journal*, **94**, 16–40.
EICHENGREEN, B. and PORTES, R. (1986). Debt and default in the 1930s: causes and consequences. *European Economic Review*, **30**, 599–640.
FERNANDEZ, R. and ROSENTHAL, R. W. (1990). Strategic models of sovereign-debt renegotiations. *Review of Economic Studies*, **57**, 331–49.
GROSSMAN, H. I. and VAN HUYCK, J. B. (1988). Sovereign debt as a contingent claim: excusable default, repudiation, and reputation. *American Economic Review*, **78**, 1088–97.
HORSTMANN, I. and MARKUSEN, J. R. (1987). Licensing versus direct investment: a model of internalization by the multinational enterprise. *Canadian Journal of Economics*, **20**, 464–81.
JANEBA, E. (2000). Tax competition when governments lack commitment: excess capacity as a countervailing threat. *American Economic Review*, **90**, 1508–19.
—— (2001). Attracting FDI in a politically risky world. *International Economic Review*, forthcoming.
KOBRIN, S. J. (1980). Foreign enterprise and forced divestment in LDCs. *International Organization*, **34**, 65–88.
—— (1987). Testing the bargaining hypothesis in the manufacturing sector in developing countries. *International Organization*, **41**, 609–38.
MOTTA, M. (1992). Multinationals and the tariff-jumping argument: a game theoretic analysis with some unconventional conclusions. *European Economic Review*, **36**, 1557–71.
OMAN, C. (1984). *New Forms of International Investment*. Paris: Development Center of the OECD.
RAFF, H. (1992). A model of expropriation with asymmetric information. *Journal of International Economics*, **33**, 245–65.
REUBER, G. L. (1973). *Private Foreign Investment in Development*. Oxford: Clarendon Press.
ROWTHORN, R. E. (1992). Intra-industry trade and investment under oligopoly: the role of market size. *Economic Journal*, **102**, 402–14.
SCHNITZER, M. (1999). Expropriation and control rights: a dynamic model of foreign direct investment. *International Journal of Industrial Organization*, **17**, 1113–37.
SMITH, A. (1987). Strategic investment, multinational corporations and trade policy. *European Economic Review*, **31**, 89–96.
THOMAS, J. and WORRALL, T. (1994). Foreign direct investment and the risk of expropriation. *Review of Economic Studies*, **61**, 81–108.
VERNON, R. (1971). *Sovereignity at Bay: The Multinational Spread of United States Enterprises*. New York: Basic Books.
WILLIAMS, M. L. (1975). The extent and significance of the nationalization of foreign-owned assets in developing countries, 1956–1972. *Oxford Economic Papers*, **27**, 260–73.
WORLD BANK (1993). *World Debt Tables 1993–94*, Vol. 1. Washington DC: World Bank.
—— (1997). *Global Development Finance*, Vol. 1. Washington DC: World Bank.