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Taxing Multinationals

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Abstract

This paper analyzes the effects of tax policy on the strategic choices of multinationals and on national welfare. Contrary to existing theory, in the absence of foreign taxation, deferral of home-country taxation until earnings on outbound FDI are repatriated is generally superior to including those earnings in current income. This holds even if the home country taxes domestic investment less generously. This is also generally superior to exempting foreign income. Foreign taxes permit foreign governments to capture some of the pre-tax economic rent from the home-country FDI; this reduces the benefit to the home country of more generous taxation of outbound FDI.

Keywords: foreign direct investment, multinationals, corporation tax

JEL Code: F23, H21, H25, H32

1. Introduction

Theoretical and empirical analysis of effects of tax policy on foreign investment has focused on the incentive effects of effective marginal tax rates on investment. While such an emphasis is arguably reasonable for portfolio investment,[1] it is questionable for foreign direct investment (FDI), which is usually associated with strategic choices, imperfect competition, and the generation of economic rents. In this paper, we build on recent models of multinational firm decision making to develop a framework for evaluating effects of tax policy on the strategic choices of multinationals and on national welfare.

From a national viewpoint, the conventional result for tax policy (since Musgrave (1963, 1969), and formalized by Feldstein and Hartman (1979)) is that the domestic effective marginal tax rate on outbound FDI should be set equal to the effective marginal tax rate on domestic investment. This would be achieved by taxing the worldwide income of resident multinational firms, but allowing firms only to deduct foreign taxes in determining the home tax base, rather than crediting them. This strategy is intended to achieve production efficiency by equalizing rates of return before home-country taxes, as opposed to before all taxes.

A similar result was generated by Bond and Samuelson (1989) in a strategic game played between a capital-exporting country and a capital-importing country. In comparing a deduction and a credit for foreign taxes, they allow the home government to tax foreign-earned profits differently from domestic profits. In their model, equilibrium taxes under

credit systems are so high that deduction systems are preferred. By contrast, though, where foreign-earned profits are taxed in the same way as domestic profits, Janeba (1995) showed that a deduction system results in the same level of welfare as a credit system. These results are not generally consistent with the OECD model tax treaty (1997), which permits only a credit for foreign taxes or complete exemption in the home country; that is, it does not permit the deduction system. By contrast, Davies (2003) analyses two-way capital flows between symmetric countries, and shows that the only equilibrium involves both countries using credit systems.[2]

All of these approaches depend on there being a fixed amount of saving to be divided between domestic investment and outbound FDI. If instead, domestic firms are able to raise finance on the world market, then this link between the effective marginal tax rates on the two forms of investment is broken. Mintz and Tulkens (1996) follow this route; by also considering domestic and outbound investment serving different markets, only a revenue requirement links the two forms of investment. In general, they derive Ramsey-type inverse elasticity rules governing the optimal tax rates on each form of investment; and in general the two optimal tax rates are different from each other. In the absence of a revenue constraint on capital income taxes (if, for example, public goods can be funded from other sources of tax), then optimally, both tax rates should be zero. Further, the optimal tax rate on outbound FDI remains zero, even if the tax rate on domestic investment is constrained to be positive (as it is in Feldstein and Hartman (1979), for example).

In contrast to these approaches, we explore optimal tax policy in the presence of economic rents earned by multinational firms. Economic analysis of the multinational firm in industrial organization generally stresses economic profits from certain activities as a reason both for the firm's existence and for its overseas investment.[3] Such models are typically based on the "OLI" framework of Dunning (1977, 1981), in which advantages to investment through a multinational firm trace to ownership, locational, or internalization advantages (see also the review in Caves (1996) and Markusen (1995)); more formal models include Horstmann and Markusen (1992) and Motta (1992).

In such settings, key decisions about the location of investment (as opposed to marginal expansion of existing investment) are driven by a comparison of after-tax profit among mutually exclusive discrete choices. Hence the link between domestic and outbound investment is the strategic choice of each firm as to how to serve a foreign market: whether by exporting, or producing abroad. Each firm can raise finance on the world market, so investment is not constrained by the availability of a fixed stock of saving. Two factors are important: first, economic rents (from intangibles, cost advantages, or location-specific advantages) constitute at least part of the return on potential projects; and second, decisions involve choices among mutually exclusive locations. There is evidence to suggest that both elements characterize many FDI decisions for multinational firms (see, for example, the review in Caves (1996)). In the presence of these two factors, the relevant concept of "tax" is the fraction of expected profit absorbed by taxation in each choice. Hence the location decision is affected by the effective average tax rate on profit.[4] An emerging body of empirical work has isolated economically meaningful effects of effective average tax rate measures (or related proxies for average rates of taxation) on location and investment decisions by multinational firms.[5]

We build on recent models of multinational firm decision-making to develop a simple analytical framework for considering the impact of home country taxes on the strategic choices of multinationals and on national welfare. We do so by applying a general model of the international tax system to an adapted version of the model of Horstmann and Markusen (1992), in which two firms resident in different countries (one of which is the home country) compete in a third country, and must decide whether to locate at home or in the third country.

We use this model to analyze three regimes: (a) foreign income is taxed on an accrual basis, with foreign taxes being deductible; (b) foreign income is taxed only when repatriated, with a credit for foreign taxes (analogous to "deferral" for active foreign-source income for investments financed out of retained earnings); and (c) foreign income is exempt home country tax.

At low levels of foreign tax, we demonstrate that regime (b)—as is common practice in a number of countries, including the United States and the United Kingdom—results in higher national welfare across a range of parameters than either of the other two regimes. However, at high levels of foreign taxation, so much of the economic rent from the investment is captured by the foreign government that the accrual with deduction regime can generate higher welfare. However, in this case, the alternative options available to the firm[6] become more attractive, so that this is likely to be less relevant in practice.

A small number of other papers take a similar approach to modeling the impact of taxes on the strategic choices of multinationals, although they differ from the approach in this paper. The closest is Levinsohn and Slemrod (1993), who also analyze the home country's optimal taxation of home and foreign production in the presence of imperfect competition among multinational duopolists. However, there are several important differences. First, in our model firms make a discrete choice between producing at home or abroad. By contrast, Levinsohn and Slemrod assume that each firm produces in both locations, and chooses the split of production between the two. Second, we model explicitly the taxation of domestic and foreign source capital income, paying particular attention, for example, to whether any foreign tax is creditable or deductible. By contrast again, Levinsohn and Slemrod model output taxes and tariffs; partly as a result, their conclusion that "the optimal tax rate on foreign source income does not depend on the rate imposed in the host country" is starkly different from our results.

Other papers focus on optimal taxation in the host country. For example, Janeba (1996) analyzes a model in which a multinational firm and a domestic firm both produce in the same country; the strategic interaction between them is only through output, rather than through choice of the location or production. Janeba (1998) extends the Brander–Spencer (1985) strategic trade policy model to allow for mobile firms and finds that mobility of firms overturns the incentive to subsidize exports. However, this depends on a uniform tax being levied in the host country; implying that foreign firms locating in a country would also receive any subsidy paid. Haufler and Wooton (1999) analyze a model in which two countries compete to attract a single monopolist.

This paper is organized as follows. In Section 2, we develop in stages a model of a home firm and a foreign firm each choosing among three strategies: (A) do not serve the foreign market; (B) export to the foreign market; and (C) produce abroad to serve the foreign

market. Section 3 concludes and considers the implications of the results for international tax policy.

2. Outbound Investment with Capital Income Taxes

We consider a home-country multinational's choice of whether to supply a market in a foreign country, and if so, whether to do so by producing at home or abroad. Producing at home implies a transport cost per unit of exports to the foreign market; producing abroad incurs a fixed set-up cost. We allow for a tax levied by the home country on corporate income generated both at home and abroad, and a tax levied by the foreign country on production in that country. We set up the model in several stages.

2.1. Defining Strategic Choices

We examine the case of a single firm resident in the home country, H, considering whether and how to sell its product in a foreign country, G.[7] Output of the home firm is denoted X. The firm faces potential competition in G from an (identical) single "foreign" firm resident in a third country, which sells an identical good; output of the foreign firm is denoted Y.[8] There are two periods. Investment takes place in the first period, and production and sales to the foreign market both take place in the second period. At the end of the second period, the firm closes down and pays all remaining cash to shareholders as dividends.[9] The firm's discount rate is r; this is simply the rate of return in the international capital market. One can assume, for example, that shareholders are resident in H, but have free access to world markets.

Each firm considers the three strategies:

(A) do not serve the foreign market;
(B) export to the foreign market; and
(C) produce abroad to serve the foreign market.

The demand for the final good in G is given by an inverse demand curve:

$$p_{ij} = a - b(X_{ij} + Y_{ij}), \tag{1}$$

where p is the price of the final good. Prices and quantities are indexed by (i, j), where i = A, B, C represents the choice of the home firm and j = A, B, C represents the choice of the foreign firm.

Strategic choice B incurs transport costs to G of s per unit of exports. In general, strategic choices B and C require new investment in the first period of K'_{ij}. It is useful to express this is as a second-period value of $K_{ij} = (1 + r)K'_{ij}$. We further make the simplifying assumption of a fixed capital-output ratio, so that, for example, $K_{ij} = mX_{ij}$. There is also a fixed cost associated with strategic choice C in the first period of F'. This represents the cost of setting up production in a different country, over and above the investment of capital which is required. Thus, it includes, for example, costs of learning about the legal

and institutional framework of that country, and of generating a network of input suppliers. Again, it is useful to express this in second-period terms as $F = (1 + r)F'$. Investment in strategic choice C is undertaken by a wholly-owned affiliate in G. The investment is financed by a reduction in dividends paid by an existing affiliate to its parent in the first period.[10]

In the absence of tax, the profit levels of the alternative strategies for the home firm, V_{ij}^*, and the foreign firm, Z_{ij}^*, expressed in second-period values, are therefore:

Strategy A:

$$V_{\mathrm{A}j}^* = 0, \qquad Z_{i\mathrm{A}}^* = 0; \tag{2a}$$

Strategy B:

$$\begin{aligned} V_{\mathrm{B}j}^* &= (p_{\mathrm{B}j} - s)X_{\mathrm{B}j} - K_{\mathrm{B}j} & Z_{i\mathrm{B}}^* &= (p_{i\mathrm{B}} - s)Y_{i\mathrm{B}} - K_{i\mathrm{B}} \\ &= (p_{\mathrm{B}j} - s - m)X_{\mathrm{B}j}, & &= (p_{i\mathrm{B}} - s - m)Y_{i\mathrm{B}}; \end{aligned} \tag{2b}$$

Strategy C:

$$\begin{aligned} V_{\mathrm{C}j}^* &= p_{\mathrm{C}j}X_{\mathrm{C}j} - (K_{\mathrm{C}j} + F) & Z_{i\mathrm{C}}^* &= p_{i\mathrm{C}}Y_{i\mathrm{C}} - (K_{i\mathrm{C}} + F) \\ &= (p_{\mathrm{C}j} - m)X_{\mathrm{C}j} - F, & &= (p_{i\mathrm{C}} - m)Y_{i\mathrm{C}} - F. \end{aligned} \tag{2c}$$

Assuming Cournot competition between the two firms in the market and substituting the demand function (1) into the expressions for profit, it is straightforward to derive for each pair of strategic choices the optimal level of output for each firm. Substituting back into the expressions for profit yields the post-tax level of profit for each combination of strategies, and hence the market structure defined by the Nash equilibria. We follow this approach below. However, before doing so, it is necessary to define the tax systems to be analyzed. Note finally that we assume that firms make their choices after governments have chosen their tax regimes.

2.2. *Introducing Taxation*

We consider a standard corporation tax levied in the each country. In H the statutory tax rate is denoted t. The tax rate multiplied by the present value of depreciation allowances per unit of capital expenditure, K_{ij}, is denoted A. In the other two countries, the equivalent tax parameters are t^a and A^a. We assume that transport costs are fully deductible. Hence the post-tax level of profit for the home firm from strategy B is:

$$V_{\mathrm{B}j} = (1 - t)(p_{\mathrm{B}j} - s)X_{\mathrm{B}j} - (1 - A)K_{\mathrm{B}j} = (1 - t)(p_{\mathrm{B}j} - s - \gamma m)X_{\mathrm{B}j}, \tag{3a}$$

where $\gamma = (1 - A)/(1 - t)$ is a factor which reflects the generosity of the provision for depreciation. In general, $\gamma \geq 1$;[11] $\gamma = 1$ is the case of cash flow taxation. The equivalent holds for the foreign firm, so that

$$Z_{i\mathrm{B}} = (1 - t^a)\left[p_{i\mathrm{B}} - s - \gamma^a m\right]Y_{i\mathrm{B}}, \tag{3b}$$

where $\gamma^a = (1 - A^a)/(1 - t^a)$. This is closely related to conventional measures of the effective marginal tax rate.

However, we are concerned primarily with investigating the appropriate treatment of outbound investment. We therefore aim to analyse the properties of alternative ways of taxing the outbound investment of the home firm, conditional on these underlying tax regimes. We assume that the two tax regimes in the other two countries are identical, and further, that the foreign firm does not face any tax in its home country on income earned from production in G.

More generally, we can summarise the overall tax faced by the home firm as

$$T_{ij} = t\pi_{ij} + t^*\pi^a_{ij} + \sigma^* D^a_{ij}, \tag{4}$$

where π_{ij} and π^a_{ij} represent taxable profits in H and in G for the combination of strategies (i, j), and t^* and σ^* represent overall tax rates on, respectively, taxable profits in G and dividends (D^a_{ij}) paid by the foreign affiliate to the parent. These overall tax rates depend both on the tax system in G and the treatment of the net foreign source income by H.

There are two broad choices for the home government. First, it can tax foreign income on accrual, that is, when the income is earned, with no further tax when the income is repatriated as a dividend. In this case $\sigma^* = 0$. Alternatively, it can tax the income only when it is repatriated. In this case, $t^* = t^a$. Second, it can treat foreign taxes as an expense, and allow them to be deducted in determining the income liable to tax in H. Alternatively, it can allow taxes paid in G to be credited against the tax liability due in H, although limited so that the net tax liability in H cannot be negative. These two choices give rise to four possible combinations:

	Limited Credit	Deduction
Deferral	$t^* = t^a$ $\sigma^* = \max\left\{\frac{t - t^a}{1 - t^a}, 0\right\}$	$t^* = t^a$ $\sigma^* = t$
Non-deferral	$t^* = \max\{t, t^a\}$ $\sigma^* = 0$	$t^* = t^a + t(1 - t^a)$ $\sigma^* = 0$

In addition, the home government could simply exempt from tax income earned abroad, so that $t^* = t^a$ and $\sigma^* = 0$.

These parameters can be translated into the parameters representing the overall tax on outbound investment. To do this, consider a foreign investment by the home firm, where $F + K_{Cj} = F + mX_{Cj}$ represents the cost of the investment in second-period terms, as in the previous section. Assume that the fixed cost, F, is a form of capital expenditure. In the presence of the tax, then, this investment generates a reduction in taxable profit in G of $\hat{A}^a(F + mX_{Cj})$, where $\hat{A}^a$ is the depreciation allowance per unit of investment in G. The value of these allowances (before taxation of dividends) is $A^* = t^*\hat{A}^a$. If the investment is financed by retained earnings in the subsidiary, then dividends fall by the cost of the investment, and there is an additional reduction in the tax on dividends at rate σ^*.

Combining these effects, the net cost of the investment is $(1-\sigma^*)(1-A^*)(F+mX_{cj})$. The income generated in the second period is $p_{Cj}X_{Cj}$, which we assume is paid to the parent as a dividend, and therefore incurs tax at rate t^* and again at rate σ^*. Hence net income is $(1-\sigma^*)(1-t^*)p_{Cj}X_{Cj}$.

The value to the home firm of outbound investment is simply the net income less the net cost:

$$\begin{aligned} V_{Cj} &= -(1-\sigma^*)(1-A^*)F + (1-\sigma^*)(1-t^*)[p_{Cj}-\eta m]X_{Cj} \\ &= (1-\sigma^*)(1-t^*)\{[p_{Cj}-\eta m]X_{Cj} - \eta F\}, \end{aligned} \tag{5a}$$

where $\eta = (1-A^*)/(1-t^*)$.

Given the assumptions concerning the taxes faced by the foreign firm, the value of its investment if it produces abroad is

$$Z_{iC} = (1-t^a)[p_{iC} - s - \gamma^a m]Y_{iC}. \tag{5b}$$

The levels of post-tax profit from each strategic choice of the home firm are therefore given in (3a) for strategy B and (5a) for strategy C. The corresponding expressions for the foreign firm are (3b) and (5b).

Below, we confine our attention to three combinations of the taxation of outbound investment which are either advocated in theory, or used in practice. As noted in the introduction, the optimal approach found in the theoretical literature is to tax outbound investment on accrual with a deduction for foreign taxes. In practice, however, two alternatives are typically used: (a) limited credit with deferral and (b) exemption.

2.3. *Determining Output and Profit for Each Combination of Strategies*

We assume that the two firms play Cournot; that is, each firm chooses its optimal output level conditional on the strategy and the level of output of the other firm. It does so by maximizing the profit of the strategy—V_{ij} and Z_{ij}, respectively, for the home and foreign firm—subject to the demand equation (1). Thus, for any output level chosen by the foreign firm, Y_{ij}, the home firm sets X_{ij} as:

$$X_{Aj} = 0, \tag{6a}$$

$$X_{Bj} = \frac{a - s - \gamma m - bY_{Bj}}{2b}, \tag{6b}$$

and

$$X_{Cj} = \frac{a - \eta m - bY_{Cj}}{2b}. \tag{6c}$$

Equivalent conditions hold for the foreign firm.

For further simplicity, we assume values of the parameters which rule out either firm choosing strategy A. Combining these expressions conditional on the strategic choice generates the output levels summarized in Table 1.

The output terms reflect the relative severity of each tax system. Thus, for example, if the home country H offers low allowances on domestic investment, then A is low and

Table 1. Output levels conditional on strategic choice.

Home Firm Chooses	Foreign Firm Chooses	
	B	C
B	$X_{BB} = \frac{a-s+m(\gamma^a-2\gamma)}{3b}$ $Y_{BB} = \frac{a-s+m(\gamma-2\gamma^a)}{3b}$	$X_{BC} = \frac{a-2s+m(\gamma^a-2\gamma)}{3b}$ $Y_{BC} = \frac{a+s+m(\gamma-2\gamma^a)}{3b}$
C	$X_{CB} = \frac{a+s+m(\gamma^a-2\eta)}{3b}$ $Y_{CB} = \frac{a-2s+m(\eta-2\gamma^a)}{3b}$	$X_{CC} = \frac{a+m(\gamma^a-2\eta)}{3b}$ $Y_{CC} = \frac{a+m(\eta-2\gamma^a)}{3b}$

Table 2. Profit levels for the home and foreign firm conditional on strategic choice.

Home Firm Chooses	Foreign Firm Chooses	
	B	C
B	$V_{BB} = (1-t)bX_{BB}^2$ $Z_{BB} = (1-t^a)bY_{BB}^2$	$V_{BC} = (1-t)bX_{BC}^2$ $Z_{BC} = (1-t^a)\{bY_{BC}^2 - \gamma^a F\}$
C	$V_{CB} = (1-\sigma^*)(1-t^*)\{bX_{CB}^2 - \eta F\}$ $Z_{CB} = (1-t^a)bY_{CB}^2$	$V_{CC} = (1-\sigma^*)(1-t^*)\{bX_{CC}^2 - \eta F\}$ $Z_{CC} = (1-t^a)\{bY_{CC}^2 - \gamma^a F\}$

γ is relatively high. This configuration of parameters implies a relatively high marginal effective tax rate faced by the home firm on domestic investment, and hence a relatively low optimal level of output, given strategic choice B and the severity of the foreign tax systems, summarised by γ^a. By contrast, however, because the home firm chooses a low level of output in this case, the foreign firm chooses a relatively high level of output—that is, an increase in γ increases the foreign firm's output, conditional on the home firm's choosing strategy B. The corresponding tax parameter when the home firm chooses strategy C is η, which works in exactly the same way. The impact of the foreign tax system through γ^a is symmetric.

Substituting the output values reported in Table 1 into the demand equation (1) and the expressions for the value of each strategy for each firm yields values of V and Z corresponding to each pair of strategies chosen by the two firms. These are summarized in Table 2.

Before investigating the Nash equilibria, it is worth noting briefly some implications for firm decisions of the home country tax. First, conditional on the strategic choice, output and investment decisions depend on the impact of tax at the margin as in standard investment models. Thus, for example, under a cash flow tax with $\gamma = 1$, output levels under choice B are not affected by home country tax. However, the strategic choice also depends independently on the comparison in overall statutory tax rates, t and t^*. This reflects the fact that this is a mutually exclusive discrete choice; in such circumstances, the choice depends on an effective average tax rate (see Devereux and Griffith, 1998, 2003).

2.4. *Equilibrium of the Model*

To solve the model, we first define combinations of strategies as (i, j), where i is the choice of the home firm and j is the choice of the foreign firm. Conditional on the choice made by one firm, the other firm will choose its strategy to generate the highest post-tax profit. Using the values in Table 2, this can be expressed in terms of the size of the fixed cost, F.

To begin with, suppose that the foreign firm chooses B. In this case, the home firm will chose C—generating combination (C, B)—if and only if $V_{CB} > V_{BB}$, or:

$$F < \varphi_3 = \frac{b(X_{CB}^2 - RX_{BB}^2)}{\eta}, \tag{7a}$$

where R reflects the tax rate on domestic investment relative to the tax on outbound investment:

$$R = \frac{1-t}{(1-\sigma^*)(1-t^*)}. \tag{8}$$

Otherwise the home firm chooses B, generating regime (B, B).

To interpret the role of taxes in this condition, begin with the case in which $\gamma = \gamma^a = \eta = 1$, which holds in the absence of tax or if all taxes were based on cash flows. Although a cash flow tax does not affect marginal investment decisions, it may nevertheless affect strategic decisions. This effect arises through R, reflecting the difference in effective statutory tax rates between investing at home and abroad. Thus, for $R > 1$, for example, the effective statutory tax rate on outbound investment exceeds that on domestic investment. This implies that the cut-off value of F for which the home firm would invest abroad would be lower.

Two further effects arise from the value of allowances—and the interaction of allowance rates and the treatment of foreign source income. These effects are captured by the parameters γ, η and γ^a. The first of these can be seen directly in (7a): the higher is A^* the lower is η and hence the higher the cut-off value for F for the home firm. That is, a more generous tax system for outbound investment makes the home firm more likely to choose option C. This effect arises because it is assumed that the fixed cost takes the form of capital expenditure, and therefore receives an allowance worth A^*. The second effect of these parameters is through output levels conditional on the strategic choice, as shown in Table 1. This is the traditional effect: less generous allowances tend to reduce investment and hence output. In general, as would be expected, heavier taxation of outbound investment—represented by η, σ^* and t^*—reduces φ_3, making it less likely that the firm will choose strategy C.

Now consider the other cut-off points. If the foreign firm chooses C, the home firm chooses C if and only if $V_{CC} > V_{BC}$, or:

$$F < \varphi_4 = \frac{b(X_{CC}^2 - RX_{BC}^2)}{\eta}. \tag{7b}$$

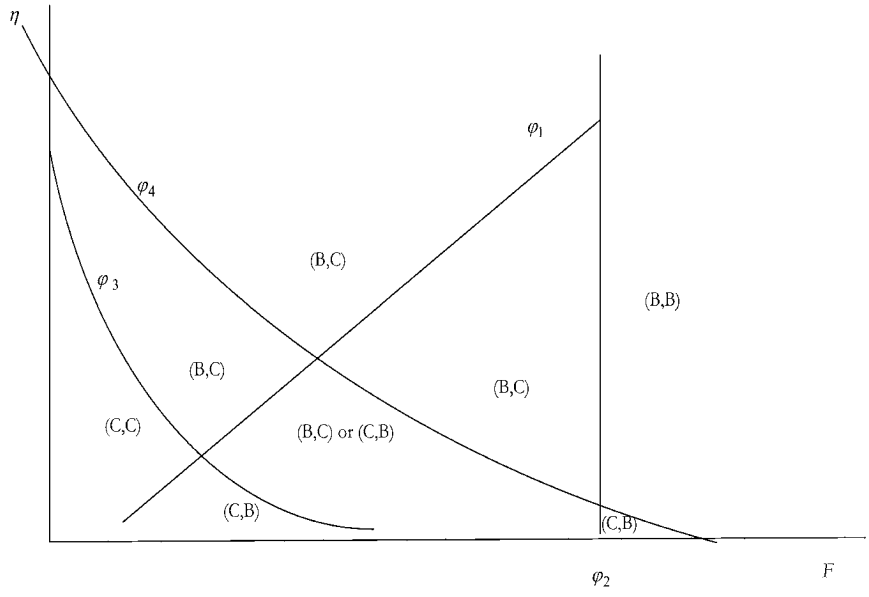

Figure 1. Nash equilibria for (η, F) combinations.

If the home firm chooses B, the foreign firm will choose C if and only if $Z_{BC} > Z_{BB}$, that is:

$$F < \varphi_1 = \frac{b(Y_{BC}^2 - Y_{BB}^2)}{\gamma^a}. \tag{9a}$$

And if the home firm chooses C, then the foreign firm will choose C if and only if $Z_{CC} > Z_{CB}$, that is:

$$F < \varphi_2 = \frac{b(Y_{CC}^2 - Y_{CB}^2)}{\gamma^a}. \tag{9b}$$

In the absence of taxes, or if $\gamma = \gamma^a = \eta = 1$ and $R = 1$, then $\varphi_1 = \varphi_3 > \varphi_2 = \varphi_4$. If the two firms have the same value of F, then both would choose strategy B if $F > \varphi_2 = \varphi_4$. Both would choose strategy C if $F < \varphi_1 = \varphi_3$. For values of F between these cut-off points, each firm would choose C only if the other chose B. We assume that one firm chooses B and the other C; and that the two possible regimes (B, C) and (C, B) are equally likely.

More generally, the critical values of F depend on taxes in the ways described above. Figure 1 presents the cut-off values shown in (7) and (9), and the Nash equilibria which arise, for alternative combinations of η and F. Each of the critical values varies with η, with the exception of φ_2 which applies to the foreign firm when the home firm chooses option B. As might be expected, both φ_3 and φ_4 fall as η rises; the higher the tax which the home firm faces on outbound investment, the less likely it is to choose strategy C.

Table 3. Summary of welfare for each strategic choice.

Home Firm Chooses	Foreign Firm Chooses	
	B	C
B	$W_{BB} = [bX_{BB} + (\gamma - 1)m]X_{BB}$	$W_{BC} = [bX_{BC} + (\gamma - 1)m]X_{BC}$
C	$W_{CB} = -(1 - A^a)[F + mX_{CB}] + (1 - t^a)[bX_{CB} + (\eta - 1)m]X_{CB}$	$W_{CC} = -(1 - A^a)[F + mX_{CC}] + (1 - t^a)[bX_{CC} + (\eta - 1)m]X_{CC}$

By contrast, φ_1 rises with η: conditional on the home firm choosing C, the higher is η, the lower the output of the home firm, and the more profitable it is for the foreign firm to choose C as well.

As Figure 1 indicates, at low levels of F, there is a (C, C) Nash equilibrium, while at high levels of F, there is a (B, B) Nash equilibrium. There are two (C, B) regions which would not exist in the absence of tax, and also a much larger (B, C) region which also would not exist in the absence of the tax.

2.5. *Measuring Welfare and Implications for Tax Policy*

We are concerned with the choice of tax system by the government of the home country, H. In order to analyze this choice, it is necessary to construct a measure of welfare, which in normative analysis, we assume that the government attempts to maximize. We use a simple measure of the welfare of the home country: the value of the investment, net of taxes paid to the foreign government, G. In essence, this is a measure of the impact on the wealth of the country undertaking the investment project, without any consideration of the distribution between the government and the private sector.[12]

Following this approach, the welfare of the home country under each pair of strategic choices is shown in Table 3. It is straightforward to show that $X_{CB} > X_{CC}$ and that $X_{BB} > X_{BC}$. And it can also be shown that $W_{CB} > W_{CC}$ and $W_{BB} > W_{BC}$. That is, any given strategy for the home firm yields higher welfare if the foreign firm chooses B instead of C. However, it is not possible to make other general comparisons between levels of welfare without more specific definitions of the tax system—particularly the treatment of outbound investment, summarized by η.

Following Feldstein and Hartman (1979), we assume that the domestic tax system, here summarized by t and A is given—specifically, we assume that $\gamma > 1$. We consider the optimal taxation of outbound investment conditional on this domestic tax system. Specifically, we compare levels of welfare under the three specific regimes for taxing outbound investment described above: (a) accrual with deduction; (b) deferral with limited credit; and (c) exemption. We do not impose any revenue requirements.[13]

To understand the factors affecting the welfare-maximising policy in this context, suppose for the moment that the foreign firm always chooses strategy B. This would be the case, for example, if there were only one foreign country. In this case, the position is similar to the classical case analysed by Feldstein and Hartman (1979). The government seeks to maximise profit after foreign country tax, but before home country tax. The firm seeks

to maximise profit after all taxes. However, the impact of home country tax differs from the classical case.

Conditional on the home firm choosing to invest abroad, the government maximises welfare by avoiding distortion to the firm's investment and output choice. It can do this using a cash flow tax, equivalent in this case to taxation with deferral and limited credit system. It can also achieve it by imposing no tax on outbound investment: an exemption system. However, conditional on $\gamma > 1$, introducing either of these forms of taxation implies that outbound investment is treated more generously than domestic investment by the home government. It might be thought that this would reduce welfare relative to the accrual with deduction regime, since the strategic choice is distorted. However, this is not necessarily the case, since the strategic choice is generally distorted by any form of taxation. Even if there is an accrual with deduction system and no tax abroad, pre-tax profits at home and abroad are affected by tax differently, with the result that the firm is less likely to produce abroad. This is likely to reduce welfare relative to the no tax case. However, it may raise or lower welfare relative to the other forms of taxation analysed here.

Reintroducing the strategic choice of the foreign firm raises another possibility. In particular, consider the case in which the domestic tax regime creates an incentive to undertake outbound investment; for example, $\gamma > 1$ and $\eta = 1$. And consider a range of values of F over which the home country responds by switching from strategy B to C. For some of these values of F, the foreign firm may respond by choosing to export instead of choosing outbound investment itself. That is, the tax regime may induce regime (C, B), where there might otherwise have also been the possibility of (B, C). This generally raises home country welfare, since the home firm captures a larger share of the market. A caveat, though, is that if the foreign country tax rate is high enough, then in turn, this higher profit may be captured by the foreign government, which may result in lower home country welfare.

Given these considerations, we rely on a simulation model to compare alternative regimes. For each regime, and given values of the parameters, the model computes the home country welfare for any value of F. We present three sets of results, corresponding to different foreign tax rates. For the purposes of comparison, it is worth noting the properties of the simulation model in the absence of tax. For values of F below 0.44, both firms would choose C. For values above 0.56 both would choose B. And between these values, one would choose B and the other C, each combination having a 0.5 probability.

2.5.1. No Foreign Tax We begin in Figure 2 with the case of no foreign tax: $t^a = 0$. The absence of foreign tax implies that there is also no distinction between limited credit and deduction. However, there remains a distinction between taxing on deferral and on accrual. Specifically, under deferral, $\eta = 1$ while under accrual, $\eta = \gamma$.[14] In Figure 2, the dotted line represents home country welfare in the case of deferral, the dashed line the case of accrual, and the unbroken line the case of exemption. The parameter values, including taxes, are given below the figure: a similar picture is found for a wide range of parameters of both the tax system and demand and cost factors.

For low values of F, combination (C, C) prevails for all three forms of taxation. Within this regime, welfare is the same for deferral and exemption: in this case, neither regime

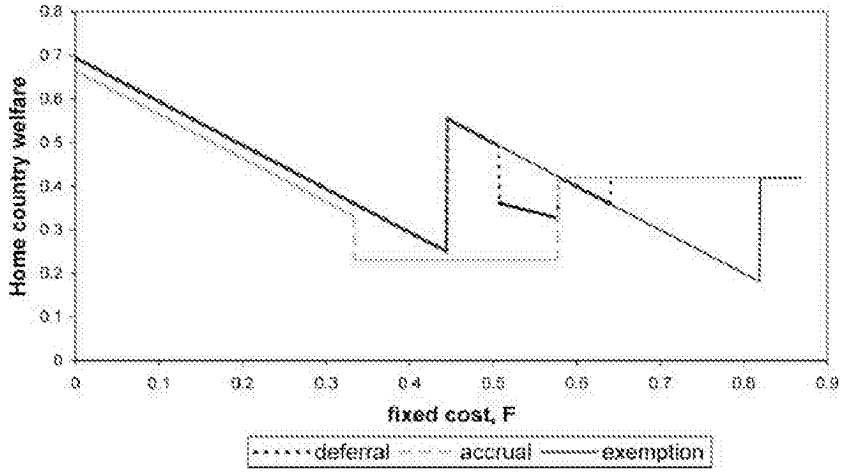

Figure 2. Welfare comparisons; $t = 0.5$, $t_f = 0$, $A = 0.8$, $a = 3$, $b = c = 1$, $m = s = 0.5$.

distorts the strategic choice or output levels. Welfare is lower under accrual because output and hence profit are lower. This difference represents the standard case of the impact of tax on the cost of capital and hence output. In the absence of strategic choices, a standard corporation tax results in lower output, profit, and welfare. A cash flow tax—as is implied by deferral—avoids this affect. However, this effect is relatively small, and is dominated by the impact of tax on the strategic choice.

As F rises, the combination of strategic choices changes. This occurs first under the accrual tax (at around $F = 0.33$); the home firm switches to home production and the regime shifts from (C, C) to (B, C). This creates a step down in welfare, since the foreign firm now has an advantage in the market since the marginal costs of the home firm rise through incurring transport costs. Thus although the home firm's post-tax profit is higher through choice B, pre-tax profit is lower. This generates a greater advantage from the other two tax regimes.

As F continues to rise, there is a step up in this advantage (at around $F = 0.44$). This is because, under deferral and exemption, the more favorable treatment of outbound investment compared with domestic investment induces the home firm to maintain its outbound investment for higher values of F, inducing the still more favorable (C, B) regime. With deferral, this regimes ends for a slightly higher F (around 0.5); here the (B, C) regime also becomes possible. (In this case we measure welfare as the mean of welfare in the two possible regimes).

There is, however, a range of values of F for which the accrual tax generates higher welfare. In the absence of all taxation, both firms would choose strategy B. But with deferral or exemption the tax advantage to outbound investment induces the home firm to choose strategy C when welfare would be higher from strategy B. In Figure 2, under deferral this occurs for a fairly small range of values of F (from around 0.57 to 65). However, under exemption, it occurs for a much larger range (up to around 0.82). Beyond this range, the

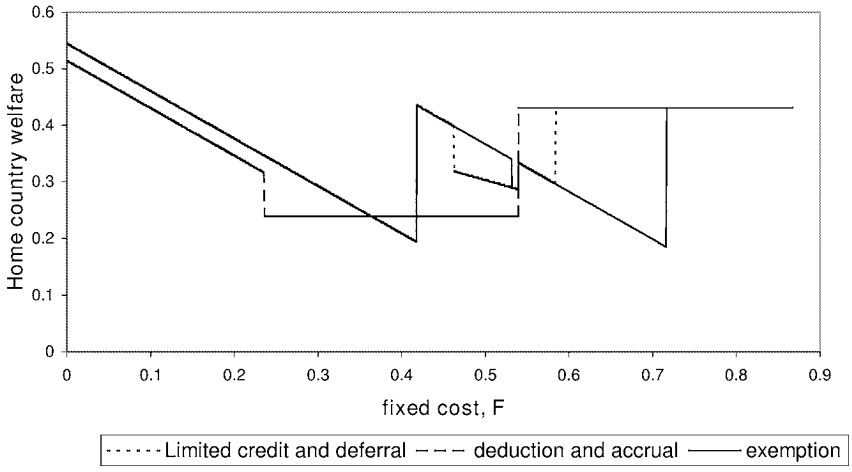

Figure 3. Welfare comparisons; $t = 0.5$, $t_f = 0.2$, $A = A_f = 0.8$, $a = 3$, $b = c = 1$, $m = s = 0.5$.

costs of outbound investment are so high that they outweigh any tax advantage, and both firms choose strategy B under any tax regime.

Overall, then, in the absence of foreign taxes, national welfare is higher under deferral than under accrual taxation for almost all possible values of the fixed cost of investing abroad. Exemption also results in the higher welfare (in most cases the same as deferral) for most values of F, but there is a much larger range for which it is dominated by accrual.[15]

2.5.2. Low Foreign Tax Rate Figure 3 explores the case of a foreign tax with a relatively low rate: $t^a = 0.2$. Because there is foreign taxation, the home government must now also choose between limited credit and deduction. The regimes in Figure 3 are broadly the same as those in Figure 2. For low values of F, both firms again choose strategy C, and again, accrual—now with deduction—generates slightly lower welfare than the other two regimes. Under all three regimes, the foreign government captures part of the economic rent, so that welfare of the home country is lower than in Figure 2.

However, under the accrual with deduction system, the home firm switches to domestic investment—generating (B, C)—at much lower values of F, reflecting the very high overall tax rate on outbound investment; the drop in welfare at this point is roughly similar to that in Figure 2. As F rises above this level, the welfare generated by the other two tax regimes —both still generating the (C, C) outcome—continues to fall, eventually to the point at which they generate lower welfare than the accrual with deduction regime. However, this occurs (initially) only for a small range of values of F, before the other two tax regimes induce a switch in production of the foreign firm, i.e. to regime (C, B). This raises home welfare again, as in Figure 2.

For still higher values of F, the pattern of changes in welfare is similar to that in Figure 2. However, due to the foreign country tax, production tends to switch to the home country for all the tax regimes at lower values of F. As a result, the range of values for which the exemption system yields the lowest welfare is somewhat smaller than in Figure 2.

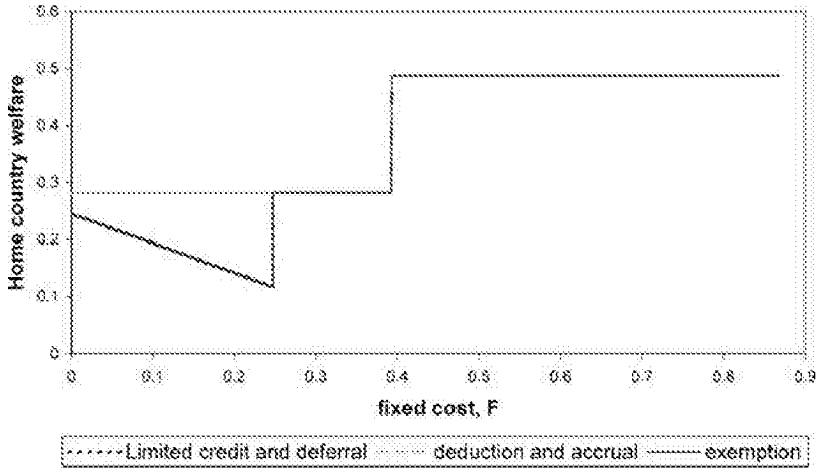

Figure 4. Welfare comparisons; $t = 0.5$, $t_f = 0.6$, $A = A_f = 0.8$, $a = 3$, $b = c = 1$, $m = s = 0.5$.

Given these tax parameters, then, the choice between the three tax regimes is ambiguous. However, as in Figure 2, the limited credit with deferral system yields the highest welfare over the greatest range of values of F.

2.5.3. High Foreign Tax Rate At still higher values of the foreign tax, however, this no longer holds. Figure 4 shows the position for $t^a = 0.6$. In this case, since $t < t^a$, the limited credit system implies that no tax is collected by the home government on outbound investment; in this case, such investment faces only the foreign tax. This is therefore equivalent to the exemption system. However, the deduction system imposes an overall tax rate $(t^a + t(1 - t^a))$ of 80 percent on outbound investment. The implication of this very high tax rate is that, even for $F = 0$, the home firm never chooses strategy C.

By contrast, under limited credit or exemption, there remains an area where the high foreign tax rate does not rule out outbound investment by the home firm. However, although the post-tax income is higher in this region under strategy C, the foreign government captures such a large share of it that home country welfare is higher under strategy B. In this case then, by in effect prohibiting outbound investment, the accrual with deduction system yields a higher level of welfare.

Of course, such high levels of tax in the foreign country are not necessarily very realistic. The standard theoretical result suggests that a capital-importing country should set the tax on capital income to zero. Gordon's (1992) analysis suggests that if the home country has a limited credit system, then the capital-importing country could instead set a tax rate up to that in the home country. But setting a higher tax rate than this is likely in practice to drive outbound investment to a different destination. And even if this did not happen, then the home firm might be able to repatriate most of the income generated as a royalty, in which case it would generally escape the tax in the foreign country.

3. Summary and Conclusions

In this paper, we provide a reconsideration of conventional models of taxation of capital income on foreign direct investment which are based on an analysis of marginal investment projects and effective marginal tax rates. We begin with the observation, common in industrial organization research on multinationals but less so in public economics, that the roles of economic rent and strategic choice should be important elements of normative and positive analysis of taxation of foreign-source income.

In the absence of foreign taxation, we find that, on average over a range of values of the fixed cost, deferral generally generates higher welfare for the home country than either accrual or exemption. If there is a distorting tax on home investment, applying a similar tax to outbound investment (i.e. accrual) would give an advantage to foreign-based multinationals in two ways: the home firm would be more likely to produce at home, and consequently supply less output to the market, and even if the home firm did produce abroad, it would still produce lower output. In both cases this can be exploited by the foreign firm to increase its profits at the expense of the home firm, and hence the welfare of the home country. By contrast, exempting foreign income can result in the home firm choosing outbound investment when welfare would be higher with domestic investment. In this case, the advantage of paying no tax on outbound investment, compared with a standard tax on domestic investment, can be so great that outbound investment is too high.

In the presence of foreign taxes, foreign governments capture some of the pre-tax economic rent associated with the home country's outbound foreign direct investment, and so outbound investment provides a smaller benefit to the home country. This consequence of foreign taxation narrows the national welfare loss from choosing accrual with deduction taxation. In fact, if the foreign tax is high enough, it is in the interests of the home country to discourage outbound investment; in this case, the system of accrual and deduction is optimal. However, there are several reasons why this is a less likely possibility.

We believe that this approach is an important step toward analyzing guidelines for tax policy toward multinational firms in a framework within which realistic industrial organization plays a significant role. We do not view our results as implying literally that all capital-exporting countries should adopt a limited credit with deferral system, since the model is too stylized to permit such a prescription. Nevertheless, the emphasis on the industrial organization of multinationals has important implications for the policy debates over whether, for example, U.S. tax policy is excessively generous to outbound foreign direct investment.[16]

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Notes

1. For portfolio investment, because the investor can be expected to earn a normal rate of return, modeling the impact of taxation on the required rate of return can reasonably emphasize the effective marginal tax rate. Since the early application of this concept of tax effects by King and Fullerton (1984), researchers have extended the analysis to cross-border investment (see, e.g., Alworth, 1998; OECD, 1991; and Devereux and Pearson, 1995).
2. An alternative explanation of the persistence of credit systems is given by Gordon (1992) who analyses the case of a Stackelberg leader in tax-setting, which by crediting taxes can induce a higher tax rate abroad, and so facilitate enforcement of its own source-based taxes.
3. Cummins and Hubbard (1995) review links between the modeling approaches taken by specialists in public economics and industrial organization.
4. Other examples in industrial organization—including R&D, constraints on investment imposed by costly external financing of projects, or entrepreneurial selection—also suggest the importance of the effective average tax rate for studying tax policy; see the discussion in Devereux and Griffith (2003).
5. See, for example, Devereux and Griffith (1998) for an empirical study using a measure of the effective average tax rate, defined in Devereux and Griffith (2003). Studies using as a measure of the average tax rate defined as current tax liability as a proportion of current income include Collins and Shackelford (1995), Grubert and Mutti (1995), and Altshuler, Grubert, and Newlon (2000).
6. Which we do not explicitly model.
7. For an excellent survey of models of "strategic trade policy" in industrial organization and international trade, see Brander (1995). Models of an international Cournot duopoly competing in a third market (akin to the structure we use here) trace their roots to Brander and Spencer (1985).
8. In an earlier version of this paper, Devereux and Hubbard (2000), we allowed for differentiated goods. However, this does not add to the insights concerning tax policy. We therefore present a version here with a single good.
9. An alternative characterization of this payment is a "royalty" to compensate the parent firm for some home-country investment in, say, advertising or R&D. In that case, the economic rent could be repatriated as a royalty, and we would confine our attention to the normal return. We do not believe this characterization is useful for two reasons. First, it is by no means clear in practice that overseas rents are created only by domestic investments (Pepsi may have to advertise in Korea to create brand loyalty there). In the context of our analytical example, suppose the parent firm is deciding between cases of producing at home for export (with rent R_1) and producing abroad (with rent R_2). If $R_2 > R_1$, it is due to exploiting conditions in the host country. Second, even if the rent were "domestic," our inquiry regards the optimal taxation of foreign-source income (in our model), not current tax practice. Finally, if the firm has a choice to pay a royalty instead of a dividend, the main effect may in any case be to prevent the foreign country charging too high a tax rate.
10. In the earlier version of this paper, we allowed also for the investment to be financed by new equity; this generates slightly different tax consequences compared to investment financed by retained earnings. However, the main insights in this paper concerning the taxation of outbound investment do not depend on the form of finance. We therefore present here only the case of investment financed by retained earnings.
11. Although it can take values less than 1.
12. That is, we assume that the marginal cost of public funds is unity. Including a higher cost is a relatively straightforward extension, but does not substantially affect the issues addressed in this paper.
13. Of course, there are alternative approaches: for example, to choose all the elements of the tax system jointly subject to a revenue requirement. However, the focus of this paper is not on the optimal structure of the corporation tax itself, but on the taxation of outbound investment given a domestic tax system. In practice,

it is hard to believe that there is a serious revenue constraint applying to tax raised from outbound investment *per se* because such tax revenues are usually very small relative to total tax revenues.

14. In the case of accrual taxation, we assume that the home government uses A, rather than A^a, to define taxable profit. This implies that, in this case, $\eta = \gamma$.
15. It is perhaps worth noting one further difference between our model and that of Feldstein and Hartman. In the Feldstein–Hartman model (1979), domestic and outbound investment are direct substitutes—that is, they are alternative uses of a *fixed* level of investment spending. In our model, any level of investment can be financed in the world market as long as it earns the world rate of return post-tax. Hence the substitution between domestic and outbound investment arises as a result of the strategic choice, given that investment is carried out in only one location.
16. See the review in Hines (1999).

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