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1 International Interactions between Tax Systems and Capital Flows

Assaf Razin and Efraim Sadka

1.1 Introduction

International capital market integration has become the subject of major theoretical and practical interest in recent times. Policymakers are becoming more and more aware of the potential benefits accruing from such integration, which allows more efficient allocations of investment and saving between the domestic and the foreign market. In particular, with the prospective comprehensive integration of capital markets in Europe in 1992, some key policy issues arise.[1]

The financial, monetary, and exchange-rate-management policy implications of capital market integration have been widely discussed in the context of the European Monetary System (EMS); see, for instance, the survey by Micossi (1988). However, capital market integration also has profound effects on the fiscal branch of each country separately and on the scope of tax coordination among them. These issues have not been dealt with extensively so far.[2]

One issue is the tax-induced distortions in the allocation of world savings

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1. In a recent paper Micossi (1988, 26) provides a succinct survey of the proposed institutional arrangements for the 1992 European integration. He writes: "The European integration entails the elimination of restrictions and discriminatory regulations and administrative practices concerning: (i) the right of establishment and acquisition of participations by foreign institutions in domestic financial markets; (ii) permitted operations of foreign-controlled financial institutions; (iii) cross-border transactions in financial services. The first two items basically involve the freedom to supply services in EC national markets, the third, the freedom to move capital throughout the Community."

2. For an earlier discussion of the interaction among taxes, government consumption, and international capital flow, see Razin and Svensson (1938).

and investment. In a world with international capital mobility, the equality between savings and investment need not hold for each country separately, but rather for world aggregate savings and investment. This separation brings out new issues of taxation in theory and practice. In a closed economy a tax on capital income drives just one wedge between the consumer-saver marginal intertemporal rate of substitution and the producer-investor marginal productivity of capital. In a world of open economies two more types of distortions can be caused by capital income taxation: (1) international differences in intertemporal marginal rates of substitution, implying an inefficient allocation of world savings across countries; (2) international differences in the marginal productivity of capital, implying that world investment is not efficiently allocated across countries.

The fundamental result of the theory of second best suggests that adding distortions to already existing ones may very well enhance efficiency and welfare. To put it differently, reducing the number of distortions in the economy may lower well-being. Thus, even though there are in general gains from international trade, some restrictions on free trade may be called for in a distortion-ridden economy.

The opening up of an economy to international capital movements affects the size and structure of the fiscal branch of its government. Capital flows influence both the optimal structure of taxes on domestic and foreign-source income, and the welfare cost of taxation. As a result, the optimal size of government (the optimal provision of public goods) and the magnitude of its redistribution (transfer) policies are affected as well.

Another issue is capital flight. There is now substantial evidence that governments encounter severe enforcement difficulties in attempting to tax foreign-source income. Dooley (1987) estimates that in 1980–82 as much as $250 billion may be classified as capital flight by U.S. residents. Tanzi (1987) reports that tax experts were concerned that lowering the U.S. individual and corporate tax rates in the U.S. Tax Reform Act of 1986 would induce capital drain from other countries by providing a tax advantage to investments in the U.S. These concerns are based on an implicit assumption that the governments of these countries cannot effectively tax their residents on their U.S. income so as to wipe out the U.S. tax advantage. The issue of capital flight is even more relevant for developing countries. Cumby and Levich (1987) estimate that a significant portion of the external debt in developing countries is channeled into investments abroad through overinvoicing of imports and underinvoicing of exports. Dooley (1988) estimates that capital flight from a large number of developing countries amounts to about one-third of their external debt in 1977–84.

Finally, integration of capital markets brings up the issues of international tax coordination, harmonization, and competition. There are two polar principles of international taxation: the *residence* (of the taxpayer) and the *source* (of income) principles. According to the first principle, residents are taxed on

their worldwide income equally, regardless of whether the source of income is domestic or foreign.[3] A resident in any country must earn the same net return on her savings, no matter to which country she chooses to channel her savings (the rate-of-return arbitrage). If a country adopts the residence principle, taxing at the same rate capital income from all sources, then the gross return accruing to an individual in that country must be the same, regardless of which country is the source of that return. Thus, the marginal product of capital in that country will be equal to the world return to capital. If all countries adopt the residence principle, capital income taxation does not disturb the equality of the marginal product of capital across countries, which is generated by a free movement of capital. If the tax rate is not the same in all countries, however, the net returns accruing to savers in different countries vary, and the international allocation of world savings is distorted.

According to the second principle, residents of a country are not taxed on their income from foreign sources, and foreigners are taxed equally as residents on income from domestic sources. Now, suppose that all countries adopt this principle. Then a resident of country H earns in country F the same net return as the resident of country F earns in country F. Since a resident in country H must earn the same net return whether she channeled her savings to country H or to country F, it follows that residents of all countries earn the same net return. Thus, intertemporal marginal rates of substitution are equated across countries, implying that the international allocation of world savings is efficient. If the tax rate is not the same in all countries, however, the marginal product of capital is also not the same in all countries. In this case the international allocation of the world stock of capital is not efficient.

Although there are two extreme principles of international taxation, in reality countries adopt a mixture of the two. Accordingly, countries partially tax foreign-source income of residents and domestic-source income of nonresidents, in which case the international allocations of world savings and of world investments are distorted.

These issues are of particular relevance for the Europe of 1992. The creation of a single capital market in the European Community raises the possibility of tax competition among the member countries, in the absence of a full-fledged harmonization of the income tax systems. Also, the possibility of capital flight from the EC to low-tax countries elsewhere has strong implications for the national tax structures in the EC. These developments renewed interest among public finance and international finance economists in the issue of tax harmonization and coordination, tax competition, the international structure of taxation, etc.[4]

3. A credit is given against taxes paid abroad on foreign-source income in order to avoid double taxation.

4. See, for instance, Alworth (1988), Bovenberg (1988), Giovannini (1988, 1989a, 1989b), Gordon (1986), Razin and Sadka (1989, 1990, 1991), Razin and Slemrod (1990), Sinn (1987), and Slemrod (1988).

1.2 Restrictions on Capital Mobility

1.2.1 The Analytical Framework

Consider a stylized two-period model of a small open economy with one composite good, serving for (private and public) consumption and for investment. In the first period the economy possesses an initial endowment of the good, and individuals can decide how much of it to consume and how much of it to save. Savings are allocated either to investment at home or to investment abroad. In the second period, output (produced by capital and labor) and income from foreign investment are allocated between private and public consumption. To finance optimally its (public) consumption, the government employs taxes on labor, taxes on income for investment at home, and taxes on income from investment abroad. For the sake of simplicity, we assume that the government is active only in the second period.

In practice, governments encounter severe enforcement difficulties in attempting to impose taxes on foreign-source income. For instance, many foreign experts worried that lowering the individual and corporate tax rates in the U.S. Tax Reform Act of 1986 would induce a capital drain from other countries since it would increase the net return to capital in the United States. They implicitly assume that governments cannot effectively tax capital invested abroad and thus cannot reduce the net return on that capital to the level of the domestic rate of return (see Tanzi 1987). Dooley (1988) estimates that a significant fraction of external claims and of external liabilities in various developing countries is unaccounted for due to capital flight.[5] Therefore, after briefly analyzing the case where foreign-source income is fully taxable, we concentrate on the more realistic case where such income is effectively taxed only partially.

We consider a representative individual with a utility function of the form

$$U(c_1, c_2, L, G) = u^p(c_1, c_2, L) + u^g(G), \tag{1}$$

where u^p and u^g are the private and the public components of the utility function, respectively; c_1, c_2, and L are first-period consumption, second-period consumption, and second-period labor supply, respectively; and G is second-period public consumption.[6]

Denote savings in the form of domestic capital by K and savings in the form of foreign capital by B. Since the focus of our analysis is on the case where income from capital invested abroad cannot be fully taxed, we assume that the pattern of capital flows is such that the country is a capital exporter (i.e., $B \geq$

5. See also Dooley (1987), Cumby and Levich (1987), and Giovannini (1989b).

6. To ensure diminishing marginal rates of substitution between private and public commodities, we assume, as usual, that u^p and u^g are strictly concave. Notice also that the separability between private and public commodities embodied in equation (1) ensures that government spending on public goods does not affect individual demand patterns for private goods or the supply of labor.

0). Hence, the amount of savings channeled through domestic investment constitutes also the domestic stock of capital in the second period.

The private-sector budget constraints in the first and second period are given, respectively, by

$$c_1 + K + B = \bar{I}. \tag{2}$$

$$c_2 = K[1 + (1 - t_D)r] + B[1 + (1 - t_F)r^*] + (1 - t_w)wL, \tag{3}$$

where t_D = tax on capital income from domestic sources; t_F = tax on capital income from foreign sources; t_w = tax on labor income; r = domestic rate of interest; r^* = world rate of interest (net of taxes levied abroad); w = wage rate; and $\bar{I}$ = initial endowment.

Obviously in the absence of quantity restrictions on capital flows, the private sector must earn the same rate of return on domestic investment and on investment abroad, i.e.,

$$(1 - t_D)r = (1 - t_F)r^*. \tag{4}$$

When quantity restrictions are imposed on investment abroad, the arbitrage condition (4) becomes

$$(1 - t_D)r < (1 - t_F)r^*. \tag{4a}$$

As is common, we consolidate the periodic budget constraints in equations (2) and (3) into a single (present value) budget constraint:

$$c_1 + qc_2 = I + B((1 + (1 - t_F)r^*)q - 1), \tag{5}$$

where

$$q = (1 + (1 - t_D)r)^{-1} \tag{6}$$

is the consumer (i.e., after-tax) price of second-period consumption in present values. In order to highlight the issues associated with capital-income taxation (i.e., saving and investment incentives and government tax revenues), we abstract from issues pertaining to variable-labor supply and assume that the labor supply is inelastic. Accordingly, after-tax labor income is added to the initial endowment, and their sum is denoted by I in equation (5).[7]

The second term on the right-hand side of equation (5), namely $B((1 + (1 - t_F)r^*)q - 1)$, plays a crucial role in the analysis. In case there are no restrictions on capital exports, the arbitrage condition (4) must hold, and this term vanishes. Otherwise (when capital exports are restricted) condition (4a) applies, and this term becomes positive, representing inframarginal gains to the savings of the private sector that are channeled to investment abroad.

7. It is straightforward to show that efficiency considerations usually require taxing the inelastic labor income first before moving on to taxing capital income. We assume that the size of government is large enough so that the tax on labor income does not suffice to finance government consumption and thus a distortionary tax on capital income is also required. Formally, we conclude that $I = \bar{I}$.

A maximization of the utility function U, subject to the budget constraint in equation (5), yields the consumption demand functions:

$$c_o = c_i(q, I + B((1 + (1 - t_F)r^*)q - 1)), \quad i = 1, 2. \tag{7}$$

The utility obtained from these demand functions (the indirect utility function) is

$$V = v(q, I + B((1 + (1 - t_F)r^*)q - 1)) + u^g(G). \tag{8}$$

Domestic output (Y) is produced in the second period by capital and labor, according to a production function that exhibits diminishing marginal products. Suppressing the fixed labor input, we write the production function as

$$Y = F(K). \tag{9}$$

The firm's demand for capital is determined by the marginal productivity condition:

$$F'(K) = R. \tag{10}$$

Equilibrium in the first period requires that the demand for domestic capital (i.e., K) is equal to the supply of domestic capital (i.e., $I - c_1 - B$):

$$K = I - c_1 - B. \tag{11}$$

Similarly, equilibrium in the second period requires the equalization of (private and public) demand for and supply of consumption goods:[8]

$$c_2 + G = F(K) + K + (1 + r^*)B. \tag{12}$$

Substituting equation (11) into equation (12) yields the single (consolidated) equilibrium condition:[9]

$$c_2 + G - F(I - c_1 - B) - (I - c_1 - B) - (1 + r^*)B = 0. \tag{13}$$

As mentioned previously, we employ the analytical framework to examine two distinct regimes. The first regime, which we may term the *optimum*, entails no constraints on the taxation of foreign-source income. This regime is considered a benchmark case. In the second, more realistic regime, which we may term the *suboptimum*, foreign-source income cannot be taxed as effectively as domestic-source income. To highlight the distinction between the regimes, we simply assume that in the second regime no tax can be levied on foreign-source income (i.e., $t_F = 0$).

8. This condition must hold because obviously there will be no savings and investment in the second (and last) period.

9. The government budget constraint is $rt_DK + r^*t_FB + F(K) - rK = G$. Note that the term $F(K) - rK$ represents the revenue from taxes on labor income. Notice also that by Walras's law this constraint is satisfied in equilibrium.

1.2.2 The Optimal Regime

This section deals with the case where the government can tax foreign-source income as effectively as domestic-source income. The question naturally arises whether it would be indeed optimal to levy the same tax rate on the incomes from these two sources and abstain altogether from quantity controls on capital exports.

Since there are distortionary taxes as part of the optimal program, the resource allocation is obviously *not Pareto-efficient*. In general, the intertemporal allocation of consumption, the leisure-consumption choice, and the private-public consumption tradeoffs are all distorted. Nevertheless, we show in this section that the optimal program (namely, the regime in which no constraints on taxation of foreign-source income exist) requires an efficient allocation of capital between investment at home and abroad, so that $F_1 = r^*$. That is, the marginal product of domestic capital must be equated to the foreign rate of return on capital.

To derive the optimal program, the government maximizes the indirect utility function in equation (8) subject to the equilibrium condition in equation (13). The control (policy) variables at the government's disposal are the tax rate on domestic capital income (t_D) or, more generally, the consumer price of future consumption (q), the tax rate on capital income from abroad (t_F), the level of public consumption (G), and the quota on capital exports (B). Carrying out the optimization problem yields the efficiency condition

$$F' = r^* \tag{14}$$

(see Razin and Sadka 1991).
Accordingly, savings of the private sector must be allocated efficiently between investment at home and investment abroad. Since $F' = r$, the arbitrage condition is satisfied if the two tax rates are equalized, i.e.,

$$t_D = t_F. \tag{15}$$

In such a case there is no need to impose any quantity restrictions on capital exports.[10]

1.2.3 The Suboptimal Regime

We turn now to a more realistic case where the government cannot effectively tax income from investment abroad. To highlight this phenomenon we set $t_F = 0$ and write $t_D = t$. In this case, if the government allows unlimited exports of capital, then capital will flow out of the country until the net return on domestic investment equals the net return on investment abroad:

10. Evidently this is an open economy variant of the aggregate efficiency theorem in optimal tax theory (e.g., Diamond and Mirrlees 1971, Sadka 1977, and Dixit 1985).

$$(1 - t)r = r^*. \tag{16}$$

This means that $F' = r > r^*$, so that the domestic stock of capital is smaller than in the optimal regime (where $F' = r^*$), given that the marginal productivity of capital is diminishing. The mirror image of such an underinvestment in capital at home is an overinvestment in capital abroad.

Therefore, an interesting issue that arises in this context is whether it is now efficient from the society standpoint to restrict the exports of capital, and if so, how severe should the restriction be. One may ask, for instance, whether the restriction on exports of capital should bring the domestic capital stock all the way back to a level that is even higher than in the optimal regime (i.e., an overinvestment in domestic capital). Furthermore, is it possible that capital exports should be altogether banned when foreign-source income cannot be effectively taxed? We address these issues below.

To derive the effects of a change in the capital-export quota on welfare, we totally differentiate the indirect utility function in equation (8) with respect to B. This yields

$$\frac{dv}{dB} = -v_y \frac{K}{q}\frac{dq}{dB} + v_y((1 + r^*)q - 1), \tag{17}$$

where $v_y > 0$ is the marginal utility of income.

Similarly, total differentiation of the market-clearing condition in equation (13) yields the general equilibrium effect of a change in the capital export quota on the after-tax price of future consumption:

$$\frac{dq}{dB} = (-((1 + r)c_{1y} + c_{2y})((1 + r^*)q - 1) + r^* - r)A^{-1}, \tag{18}$$

where

$$A = (1 + r)c_{1q} + c_{2q} + ((1 + r)c_{1y} + c_{2y})(1 + r^*)B < 0. \tag{19}$$

The terms c_{1y} and c_{2y} are the income effects on present consumption and future consumption, respectively, and the terms c_{1q} and c_{2q} are the gross (future consumption) price effects on present consumption and future consumption, respectively. Note that the specification in equation (18) implies that the government adjusts its budget in response to the change in the capital export quota only by altering tax rates and not through adjustment in spending. However, the derivations below show that welfare improves even with the restricted measures; a fortiori the welfare level should rise with the unrestricted measures.

Consider now the point where no restrictions on capital exports are imposed. We refer to this case as the laissez-faire case. The arbitrage condition in equation (4) then implies that

(20) $$q = (1 + r^*)^{-1}.$$

Hence, employing (17) and (18), we conclude that

(21) $$dv/dB = -v_y K(r^* - r)A^{-1}.$$

Since $r^* < r$ and $A < 0$, it follows from equation (21) that $dv/dB < 0$ at the laissez-faire point. This means that reducing B is welfare-improving. Namely, the government should impose a binding quota on capital exports in order to reduce the amount invested abroad. It can be shown that such a quota usually raises the stock of domestic capital.

Having established that some restrictions on capital exports are desirable when the government is unable to tax the income from the exported capital, we turn now to the question of how severe the restrictions should be. As a benchmark consider K^*, the stock of domestic capital exported under the optimal regime defined by $F'(K^*) = r^*$. Starting from this benchmark we now investigate the policy question, whether the restrictions on capital exports should be severe enough so as to bring the stock of domestic capital to a level that exceeds even K^*, or whether the level of domestic capital still remains below K^*. (See fig. 1.1; K^{**} is the second-best optimal capital stock, and K_{LF} is the laissez-faire capital stock.)

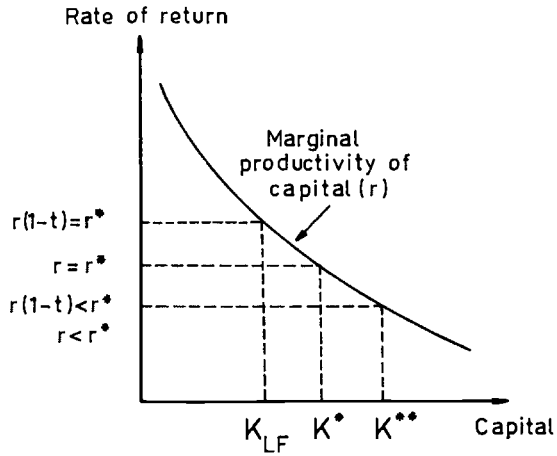

Fig. 1.1 Efficient stock of domestic capital with and without taxation of foreign-source income

Note: K_{LF} = laissez-faire stock of capital with no taxation of foreign-source income. K^* = efficient stock of capital with taxation of foreign-source income. K^{**} = efficient stock of capital with no taxation of foreign-source income.

To do this, we evaluate the derivative of the indirect utility function, dv/dB, at the point where $K = K^*$ (and consequently, $r = r^*$). This derivative is

$$\left[\frac{dv}{dB}\right]_{K=K^*} = v_y((1 + r^*)q - 1)A^{-1}rt\, c^o_{1q}, \tag{22}$$

where c^o_{1q} is the Hicks-Slutsky compensated effect of a change in the price of future consumption (q) on present consumption (c_1). Since two goods must always be net substitutes, it follows that $c^o_{1q} > 0$. Hence, $dv/dB < 0$ at the point $K = K^*$. This means that reducing B further, beyond the point where $K = K^*$ (and $r = r^*$), enhances individual welfare. This implies that the stock of domestic capital rises to a level that exceeds the corresponding level in the optimal regime, implying that $r < r^*$. Thus, when the government cannot effectively tax the income from the capital invested abroad, it is efficient to overinvest in capital at home up to a point where the marginal product (r) falls below the world rate of interest (r^*).

Finally, we turn to investigate an extreme possibility: should capital exports be altogether banned (i.e., $B = 0$) when the government cannot effectively tax the income from the capital exported? Obviously, if $dv/dB < 0$ at $B = 0$, then no capital exports should be allowed.

It turns out that the latter is a real possibility. To see this, notice that equations (17)–(19) imply after some tedious algebra that at $B = 0$ we have

$$\left[\frac{dv}{dB}\right]_{B=0} = v_y A^{-1}(rtc^o_{1q}((1 + r^*)q - 1) - c_2(r^* - r)). \tag{23}$$

Now, when r is sufficiently close to r^*, then $dv/dB < 0$ because $A < 0$ and $c^o_{1q} > 0$. In this case, a total ban on capital exports is called for. The rationale for this result is straightforward. When r is close to r^*, there is very little gain for the society as a whole from investing abroad, because this gain is equal only to the difference between r and r^* (though the private sector can still gain considerably from investing abroad if $r(1 - t)$ is considerably below r^*). However, the government loses a significant amount of tax revenues from the outflow of capital. Therefore, in this case, it is not efficient to allow exports of capital.

Since there are distortionary taxes as part of an optimal fiscal program, obviously the resource allocation is not Pareto-efficient: the intertemporal allocation of consumption, the leisure-consumption choice, and the private-public consumption tradeoffs are all distorted. Nevertheless, when the government can tax its residents on their foreign-source capital income, it is optimal to allow capital to move freely in or out of the country. That is, optimal policy requires an efficient allocation of capital between investment at home and abroad so that the marginal product of domestic capital is set equal to the world rate of interest (net of foreign taxes). Evidently, this is an open economy

variant of the aggregate efficiency theorem in optimal tax theory (see Diamond and Mirrlees 1971, Sadka 1977, and Dixit 1985).

Notice also that this production efficiency result implies also that it is optimal to have a nondifferential tax treatment of foreign and domestic sources of income. One might argue that the investment efficiency result (i.e., equating the return on capital at home to the return on capital abroad via free international capital flows) is not valid when the government is concerned about financing its debt. For opening an economy to international capital flows will raise the domestic interest rate to the world rate. In such a case, a government that is burdened by an ongoing deficit incurs a higher interest cost of financing this deficit. In fact, it loses some of its monopsony power in the domestic capital market. It can then be argued that the government may not wish to allow residents to invest abroad. However, in this case it can be shown that the investment efficiency result is still valid nevertheless, because the government can offset the cost of losing its monopsony power by an appropriate tax policy.

We have shown, however, that when the government cannot effectively tax foreign-source income, it should put severe restrictions on capital exports and bring the marginal product of domestic capital to a level that is even below the world rate of interest. The loss in the return to the private sector on their total investments (at home and abroad) due to the reallocation of capital from abroad to home is more than offset by the extra tax revenues accruing to the government on the income from the capital shifted to home.

An important issue concerning capital flight if capital mobility is effectively free is the vanishing of the capital income tax from the optimal tax menu. Optimal taxation of capital income is usually subject to two conflicting forces. On the one hand, the income from existing capital is a pure rent and taxing away rents is efficient. On the other hand, the taxation of the returns on current and future investments would retard growth, which may not be efficient. We have argued that the optimal policy, in the face of free capital mobility, calls for applying the residence principle of a uniform treatment of foreign- and domestic-source income. Consequently, if tax on foreign-source income from capital is not enforceable, the optimal tax on domestic-source income would vanish.

In summary, no capital income tax whatsoever can be imposed efficiently by a small open economy if capital flight to the rest of the world cannot effectively be stopped. Consequently, all the burden of taxes falls on the internationally immobile factors, such as labor, property, land, and so on. The global tax system becomes very much like a local and state tax system (within a federal system as in the United States), in which the largest share of revenue arises from taxes on property and excises. The capital-flight equilibrium is obviously welfare inferior to the residence-based system of capital taxation that ensues whenever the tax enforcement problem is solved.

1.3 The Cost of Public Funds and the Size of Government

The optimal size of government, or more precisely the optimal provision of public goods, must be determined by an appropriate cost-benefit analysis. Such analysis implies that the marginal cost of public funds must be equated to the marginal utility from public goods. To find the effect of liberalization in the international capital markets on the optimal quantity of public goods, we discuss here the effect of such a liberalization on the cost of public funds in a small open economy.

In calculating the cost of public funds, one must take into account the optimal response of the structure of taxation (on incomes from all sources) to the international capital market liberalization, because the cost of public funds is derived from a process of tax optimization. Therefore, we must also discuss the effect of liberalization on the structure of taxation. Of course, entangled with the structure of taxation is also the issue of the optimal size of income redistribution.

Suppose that the government can effectively tax income from capital invested abroad. In this case, a liberalization of the capital market is welfare-improving. Therefore such a liberalization entails an income effect. Such an effect usually tends to increase the marginal utility of public goods. In addition it may lower the marginal cost of public funds because the government benefits directly from the liberalization as it taxes the increased amount of income from the capital invested abroad and can therefore lower the tax burden on domestic sources. Therefore, the income effect tends to increase the provision of public goods and the size of income redistribution. On the other hand, the liberalization may change the internal terms of trade (e.g., the real wage, etc.) and affect directly the cost of producing public goods. The effect of this change in the terms of trade on the cost of public funds and the size of government cannot a priori be determined and should be examined empirically.

1.4 Feasible International Tax Structure

Capital market integration between two countries brings out the issue of the feasibility of their tax structures. When residents of one country invest in the other country, one must reckon with the possibility of tax arbitrage that may undermine the feasibility of integration.

To highlight this issue, consider a two-country world with perfect capital mobility. Denote the interest rates in the home country and the foreign country by r^H and r^F, respectively. In principle, the home country may have three different tax rates applying to interest income:

(i) t^H_{RD} = the tax rate levied on domestic residents on their domestic-source income;

(ii) t^H_{RF} = the tax rate levied on domestic residents on their foreign-source income;

(iii) t^H_{NRD} = the tax rate levied on nonresidents on their interest income in the home country.

The foreign country may correspondingly have three tax rates, which we denote by t^F_{RD}, t^F_{RF}, and t^F_{NRD}. Furthermore, assume that these rates apply symmetrically for both interest earned and interest paid (i.e., full deductibility of interest expenses, including tax rebates).

A complete integration of the capital markets between the two countries (including the possibility of borrowing in one country in order to invest in the other country) requires, due to arbitrage possibilities, the fulfillment of the following conditions:

$$r^H(1 - t^H_{RD}) = r^F(1 - t^F_{NRD})\,(1 - t^H_{RF}) \tag{24}$$

and

$$r^H(1 - t^H_{NRD})\,(1 - t^F_{RF}) = r^F(1 - t^F_{RD}). \tag{25}$$

The first condition applies to the residents of the home country and requires that they be indifferent between investing at home and abroad. Otherwise, they can borrow an infinite amount in the low (net of tax) interest–rate country in order to invest an infinite amount in the high (net of tax) interest-rate country. The second condition similarly applies to the residents of the foreign country.

Notice that unless

$$(1 - t^H_{RD})\,(1 - t^F_{RD}) = (1 - t^H_{NRD})(1 - t^F_{RF})\,(1 - t^F_{NRD})\,(1 - t^H_{RF}), \tag{26}$$

the only solution to the linear system of equations (24)–(25) is a zero rate of interest in each country:

$$r^H = r^F = 0.$$

Thus, some feasibility conditions on the structures of taxes must be met in order to satisfy (26) and yield a sensible world equilibrium.

Somewhat surprisingly, the two polar schemes of source-based or residency-based taxation are examples of feasible tax structures even when the two countries do not adopt the same scheme. Consider first the case in which *both* countries adopt the source-based tax scheme. In this case, income is taxed according to its source, regardless of the residency of the taxpayer. This implies that

$$t^H_{RD} = t^H_{NRD},\ t^F_{RD} = t^F_{NRD},\ t^H_{RF} = t^F_{RF} = 0, \tag{27}$$

so that (26) is satisfied and we can have a world equilibrium with positive rates of interest.

Similarly, consider the case where both countries adopt the residence principle: income is taxed according to the residency of the taxpayer, regardless of its source. This implies that

$$t^H_{RD} = t^H_{RF},\ t^F_{RD} = t^F_{RF},\ t^H_{NRD} = t^F_{NRD} = 0, \tag{28}$$

so that, again, (26) is satisfied.

Next, consider the case in which one country adopts one tax scheme while the other adopts another one. Suppose, for instance, that the home country adopts the residence principle, while the foreign country adopts the source principle. In this case we have

$$t^H_{RD} = t^H_{RF},\ t^H_{NRD} = 0, t^F_{RD} = t^F_{NRD},\ t^F_{RF} = 0, \tag{29}$$

and, again, (26) is satisfied.

However, if the two countries do not stick to one of the two polar schemes, then (26) need not hold and no sensible world equilibrium exists. Suppose, for instance, that each country levies the same tax rate on its residents (irrespective of the source of their income) and also all nonresidents investing in that country. In this case, we have

$$t^H_{RD} = t^H_{RF} = t^H_{NRD},\ t^F_{RD} = t^F_{RF} = t^F_{NRD}. \tag{30}$$

Hence, unless $(1 - t^H_{NRD})(1 - t^F_{NRD}) = 1$, which is just a sheer coincidence, condition (26) is violated.

Thus, some feasibility conditions on the tax structure are essential for a full capital market integration. Any mutually beneficial tax coordination or harmonization must satisfy the tax arbitrage condition (26). There are two considerations. One concerns the indirect manipulation of the international terms of trade by various fiscal measures (other than explicit trade barriers such as tariffs and quotas), which is akin to the familiar "trade wars." Tax coordination is Pareto-improving when the terms of trade are subject to manipulation by national governments. The second consideration, which received less attention, concerns the international and domestic misallocation of resources that is generated by tax competition for given terms of trade.

This section focuses on the second of these two elements, since the first one has been exhaustively studied and has become by now a textbook case. Consider therefore a stylized model in which tax competition within the group of countries that we analyze cannot affect their terms of trade. This can be accomplished by assuming that this group of countries is small relative to the rest of the world, which effectively sets the international terms of trade.

Suppose first that fiscal policies are not harmonized internationally, so that the two countries are engaged in tax competition. Some minimal degree of coordination among the two countries and the rest of the world prevail, however, so that they can effectively tax their residents on foreign-source income.

It can be shown that it is not optimal from the individual country's standpoint to tax foreigners on their income from capital invested in that country.

Each one of the competing countries would tax its residents uniformly on their capital income from all sources, domestic as well as foreign. Thus, tax competition leads each country to adopt the residence (or worldwide) principle for the taxation of income from capital. This behavior implies that there are no gains from tax harmonization.

In order to implement effectively a policy of taxing worldwide income, a considerable degree of coordination among countries is required, such as, for example, an exchange of information among the tax authorities, withholding arrangements, relaxing bank secrecy laws, etc. Suppose that the competing countries can reach such coordination, which enables each to effectively tax its residents on their income from capital invested in the other country, even though they continue to engage in tax competition. However, assume now that they cannot tax the income from capital invested in the *rest of the world*, as they have no coordination (exchange of information, etc.) agreements with the rest of the world. This seems a rather interesting and realistic case that captures the essence of a problem hindering European integration, that of capital moving to low-tax countries in the rest of the world.

It can be shown in this case that the rate-of-return arbitrage condition prevents each one of the competing countries from taxing its residences on their income from capital invested in the other country, even though their tax authorities can cooperate on such things as tax withholding, etc. This may explain why the EC dropped the idea of imposing a withholding tax on capital income. Tax competition leads to an extreme situation where *no tax whatsoever* is imposed by any one of the competing countries on capital income from any source. All of the tax burden falls on the internationally immobile factors (unskilled labor, land, etc.). Here again it can be shown that tax harmonization among our initially competing countries will yield no gains for them.

In conclusion, there are no gains from tax harmonization among competing countries that constitute just a fraction of the world economy, regardless of whether or not they are coordinated with the rest of the world. However, the first case in which there is some coordination with the rest of the world yields a higher level of welfare compared to the second case where no such coordination exists. These propositions underscore the important role of tax coordination.

Bilateral double-taxation agreements are often in the form of credit and exemption provisions implemented by the residence country. These methods are close sometimes to the residence principle, but at other times to the source principle. Under the credit system firms typically pay the residence country tax when this country tax is higher than the tax in the source country. However, companies often defer the taxation of foreign subsidiary income until repatriation and can thus effectively choose to pay according to the source principle if the source country tax is lighter. If the source country tax is higher than the residence country tax, the tax system under the credit system effectively worked according to the source principle.

Tax exemption by the country of residence, at the company level, is often consistent with the source principle. Things become even more complex for multinational corporations with highly integrated activities across countries, by the conduct of various transfer price techniques to allocate profits so as to minimize the tax burden. In such cases the tax system is effectively consistent with the residence or the source principles, depending on whether the residence or the source country is the one that imposes the lower tax rate.

Table 1.1, which summarizes the corporate tax systems in the European Community, shows a large disparity in tax rates and the frequency of credit-exemptions provisions. Our analysis suggests that substantial convergence of rates and credit-exemptions provisions consistent with the residence principle is expected with the creation of the single capital market in Europe and the further integration of the world capital market in the 1990s.

1.5 Conclusion

We analyze three policy issues that arise with the international integration of the capital markets. One issue is the effects of the opening up of an economy to international capital movements on the size of government and the structure of taxes. A second issue is the incentive to restrict the size of capital exports in the presence of capital flight. A third issue is the provisions of the

Table 1.1 **European Community: Corporate Tax Systems (1989)**

	Statutory, Corporate Tax Rate	Investment Incentives	Taxation of Foreign Source Income
Belgium	43	13% reduction	Exemption
Denmark	50	—	Exemption or Credit[a]
France	39	—	Exemption
Germany	56	—	Deduction or Exemption[b]
Greece	35	—	Credit
Ireland	43	—	Credit or Deduction[c]
Italy	36	—	Credit
Luxembourg	36	12 % Credit	Credit or Exemption[b]
Netherlands	35	—	Credit
Portugal	36	—	Credit
Spain	35	5% Credit	Deduction Credit or Exemption[d]
United Kingdom	35	—	Credit or Deduction[e]

Source: A. Lans Bovenberg and George Kopits, Harmonization of Taxes on Capital Income and Commodities in the European Community, International Monetary Fund, October 1989.

[a]Exemption is from France, Germany, Ireland, Portugal, and Spain.

[b]Exemption under treaty.

[c]Credit.

[d]Credit on exemption under treaty.

[e]Deduction under treaty.

taxation of foreign-source income from capital that emerge from international tax competition and the advantages of international tax harmonizations. Our analysis suggests that a significant tax restructuring could follow the progressing process of integration of the world capital markets, and we highlight the significance of coordination between national tax authorities to enable the functioning of a worldwide system of taxing capital income.

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Comment

Toshihiro Ihori

Assaf Razin and Efraim Sadka present a very clean theoretical paper that explains its assumptions and conclusions and leaves little for the discussant to do except to provide an intuitive explanation of the results. The paper provides a very neat analysis of the profound effects of capital market integration on the fiscal policy of each country separately and on the scope of tax coordination among them. This paper discusses two issues: tax-induced distortions in the allocation of world savings and investment, and the issue of tax coordination. I would like to comment on the first issue.

The main conclusion of section 1.2 is that when the government cannot effectively tax foreign-source income, it should put severe restrictions on capital exports. First, let me explain intuitively the results using a diagram. Suppose $G = 0$, and hence the government need not impose any taxes. In such a case there is no need to impose any quantity restrictions on capital exports, B. As shown in figure 1C.1, the laissez-faire is optimal. E^* is the optimal production point and F^* is the optimal consumption point. Figure 1C.1 may be regarded as the standard diagram with respect to gains from trade. c_1 may be regarded as an export good, c_2 as an import good, and B as the amount of exports.

Suppose now $G > 0$, and G is returned in a lump-sum manner. Note that if lump-sum taxes are available, F^* is still optimal. If lump-sum taxes are not available and the government can tax foreign-source income as effectively as domestic-source income, F_1 is the optimal point. This case corresponds to the optimal regime of section 1.2.2. On the analogy of trade theory, t_D may be regarded as a consumption tax on the import good, c_2.

Suppose the government cannot effectively tax income from investment abroad, $t_F = 0$. In figure 1C.2 E_2 is the production point in the laissez-faire case ($r^* < r$), and F_2 is the associated consumption point. On the analogy of trade theory the exporting industry, which is producing c_1, now receives subsidies because $t_F = 0$ is less than t_D. In figure 1C.2 E^* is the production point

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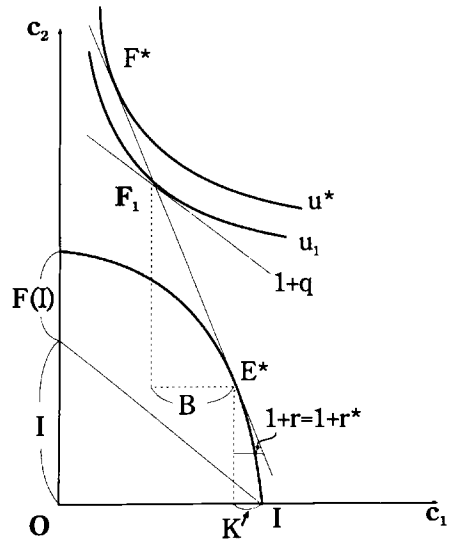

Fig. 1C.1 Gains from trade

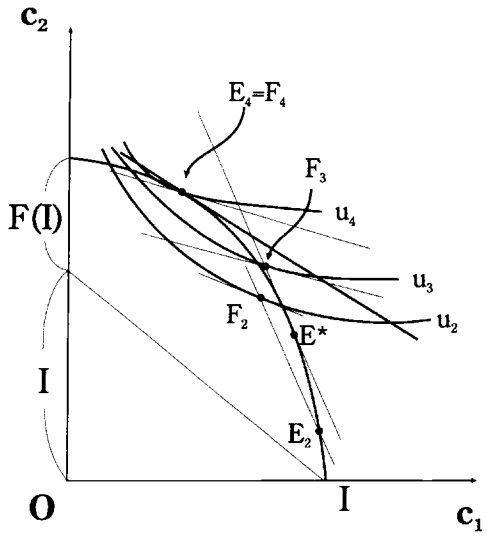

Fig. 1C.2 The case of $t_F = 0$

in the benchmark case ($r = r^*$), and F_3 is the associated consumption point. Utility at F_3 is less than utility at F_1 because q is larger in the benchmark case than in the optimal regime case. $E_4 = F_4$ is the equilibrium point under financial autarky ($B = 0$). Section 1.2.3 shows that utility at F_4 may well be higher than utility at F_2 or F_3.

Let me explain intuitively why a total ban on capital exports is called for. An increase in B means a decrease in K, and hence the revenue from taxes on labor income ($F(K) - rK$) will be reduced. In order to meet the government budget constraint, t_D has to be raised. This will raise q and hence reduce the welfare. Equation (17) implies that $dq/dB > 0$ is necessary for $dv/dB < 0$ if $(1 + r^*)q - 1 > 0$. The sign of dq/dB is crucial for the present analysis.

I have a question about the sign of dq/dB at $B = 0$. Suppose $t_F > 0$ and $t_w = 0$; that is, although the government cannot effectively tax income from investment abroad ($t_D > t_F$), the government can still impose a positive tax rate on B. And labor income taxes are not available. Then the government budget constraint is $t_D rK + t_F r^* B = G$. Suppose also for simplicity rK is independent of K. In such a case an increase in B and the associated decrease in K would mean an increase in tax revenues if t_D is fixed. A decrease in t_D is thus required to satisfy the government budget constraint, which means $dq/dB < 0$ at $B = 0$. If this case happens, from equation (17) $dv/dB > 0$ at $B = 0$. In the present paper, since labor supply is assumed to be fixed, t_w is raised to unity. However, if labor supply is highly elastic, t_w may be quite low. Would the main conclusion of section 1.2.3 still hold in such a case?

Comment John Whalley

This is an extremely interesting and well-written piece by Assaf Razin and Efraim Sadka, as we have come to expect from this very distinguished pair of authors. It looks at issues concerning international capital flow and how they affect tax interactions between economies. It argues, in effect, that tax competition between economies will tend to lead them to adopt a residence principle for taxation, and in such circumstances there are no gains from tax harmonization. On the other hand, if various restrictions are introduced, such as the inability of countries to tax capital abroad, and are combined with arbitrage conditions, tax competition will also imply that there are no taxes on mobile factors, only on immobile factors.

As far as I know, this last proposition is certainly new, relative to previous literature on tax competition, and as this literature generally is quite limited, this work is especially important. My comments are threefold. First, it seems

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to me that in the paper there are some areas of institutional weaknesses that could be improved upon. Second, the discussion of tax instruments is worthy of comment. Finally, I will make some comments on the posture of the paper in the wider context of EC integration.

In terms of the institutional weaknesses, these may be relatively minor, but the discussion in section 1.4 of bilateral double-taxation agreements often being in the form of credits and exemption provisions implemented by the resident's country, seems to me to negate what double-taxation treaties are typically all about. While they may mutually specify some treatment within the country, double-taxation agreements usually focus on the withholding tax rates on dividends, interest, and royalties. The discussion of double-taxation treaties that follows is misfocused.

Second, there is discussion of the creation of a single capital market in Europe in 1992. In fact, the 1992 exercise, while it has discussed capital integration, has done so in a very limited way. The major focus has been on treatment of banking under the single banking license. Discussion of harmonization of corporate taxes has been separate from the 1992 exercise. This policy discussion, it seems to me, is also misplaced.

Furthermore, throughout the paper there are incorrect references to various features of arrangements. For instance, table 1.1 implies there is a single corporate tax rate in Germany, but because of the split credit imputation system, a 56–36 split in rates currently applies.

Beyond this, the discussion of instruments is worthy of further comment. Section 1.4 begins with a consideration of three tax rates t_{RD}, t_{RF}, and t_{NRD}. The first two of these, it seems to me, are typically treaty-bound and therefore usually the same, which places substantial limitations on the analysis that follows. In addition, it is misplaced to argue that these are the only instruments that countries use to control capital flows. Part of the Uruguay Round exercise, for instance, is about trade-related investment measures (TRIMs). These may include participation schemes commonly used in particular sectors, which guarantee participation of domestic equity owners. There are also tax holidays and many other such instruments. Thus, a full range of instrument substitution has to be acknowledged, even though it may be difficult to build into the analytical structure of the paper.

Finally, I have a few comments on European integration and how this fits into the wider discussion in the paper. Since the relative absence of tax competition in the European case is a particularly notable feature, it is interesting that thirty years after the Treaty of Rome there is still no agreement on a common corporate tax system. There have been repeated attempts to move toward a common imputation system, but at the moment no draft directive exists on what that common system will be. With the likely eventual move to an imputation system, however, there is also talk of the use of a refundable credit system with refundability limited to other EC countries, the echo of the restricted origin principle long discussed for the VAT.

In addition, besides the limited agreement on integration, the corporate tax

rate reductions that have occurred in recent years across all the European countries seem to me, again, not to have been driven by tax competition effects but by a common intellectual climate under which it was widely believed that reductions in taxes to stimulate investment would be good. This began with the 1984 budget in the United Kingdom and continued with tax reductions in a number of other European countries. Thus, one might be tempted to conclude that, in the mid- to late 1980s, reductions in corporate tax rates were widespread among the European countries and were a reflection of tax competition. I would strongly disagree with that proposition. The European experience, it seems to me, even though it may have some relationship to the analysis in this paper, is more distant than the authors suggest.