International taxation in an integrated world

Frenkel, Jacob and Razin, Assaf and Sadka, Efraim

MIT Press

1992

NBER WORKING PAPERS SERIES

BASIC CONCEPTS OF INTERNATIONAL TAXATION

Jacob Frenkel

Assaf Razin

Efraim Sadka

Working Paper No. 3540

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
December 1990

NBER Working Paper #3540
December 1990

BASIC CONCEPTS OF INTERNATIONAL TAXATION

ABSTRACT

Free movements of goods and capital across national borders have important implications for both direct and indirect taxation. The paper discusses the following issues:

(a) The implications of different treatments of resident capital income originating abroad and nonresident capital income originating at home;

(b) The implications of different treatments of exports and imports under the indirect tax system (VAT);

(c) What is the economically efficient international tax structure.

Jacob Frenkel
NBER and Research Department IMF
700 19th Street NW
Washington, DC 20431

Assaf Razin
NBER and Department
of Economics
Tel Aviv University
Ramat Aviv 69978
Tel Aviv, ISRAEL

Efraim Sadka
Department of Economics
Tel Aviv University
Ramat Aviv 69978
Tel Aviv, ISRAEL

BASIC CONCEPTS OF INTERNATIONAL TAXATION

1 Introduction

The various ways national tax systems treat international flows of goods and capital may affect significantly the efficiency of resource allocation in the integrated world economy. Free movements of goods and capital across national borders have important implications for both direct and indirect taxation. With respect to direct taxation (income taxation) a key issue is how the home country treats resident capital income originating abroad and non-resident capital income originating at home. With respect to indirect taxation (value-added taxation) a key issue is whether the tax is applied to exports or imports of goods and services.

With international flows of capital and goods, each flow may be subject to two tax jurisdictions. An export of one country, is by its very nature, an import of another country. Thus, the possibility of double taxation is very real and has far reaching implications for the direction and magnitude of the flows of capital and goods in the world economy. For instance, if the home country taxes its residents on their capital income originating in the foreign country and the foreign country taxes nonresidents on their capital income originating in the foreign country, then such income is subject to double taxation. Such double taxation may apply also to exports and imports of goods and services. With unconstrained flows of capital and

goods, double taxation typically gives rise to tax arbitrage that may undermine the viability of the international market equilibria.

In this chapter we analyze the basic principles of taxation of exports and imports of capital and goods. We describe some common practices and elaborate on their implications for double taxation, the viability of international market equilibria in a borderless world economy and the efficiency of the international allocation (or location) of savings, investments, production and consumption.

2 Direct Taxation: Residence Principle vs. Source Principle

2.1 Basic Principles

Two common principles of international taxation which lay the foundations for many national tax systems are the residence principle and the source principle. The residence principle uses the place of residency of the taxpayer as the basis for assessment of tax liabilities while the source principle emphasizes the source of income as the basis for assessing tax liabilities. To explain these principles, it will be convenient to employ the familiar home country-foreign country framework of international economics. According to the residence principle, residents of the country are taxed uniformly on their world-wide income, regardless of the source of that income (domestic or foreign). Similarly, non-residents are not taxed by the home country on their income originating in that country. According to the source principle, income originating in the home country is uniformly taxed, regardless of the residency of the income recipient. In addition,

residents of the home country are not taxed by the home country on their foreign-source income. 1/

Countries may obviously adopt mixtures of these two pure (polar) principles of international taxation. For instance, a country may apply the residence principle for capital income but the source principle for labor income. Alternatively, one principle may be applied to individual taxpayers and the other principle to corporate taxpayers. Likewise, the home country may tax its residents at a high rate on their domestic-source income and at a low rate on their foreign-source income, and tax non-residents on their income originating at home at a rate lower than the one applied to residents.

Mixtures of the two pure principles, either within the same country or among different countries may involve, in some way or another, double taxation (by the two countries) of the same income. Such double taxation is however frequently eliminated by a system of domestic tax credits for foreign taxes. It is worth noting that if all countries adhere to the same pure principle (either residence or source), there will be no double taxation. For instance, if both the home country and the foreign country adopt the residence principle, then all the four possible categories of income are taxed only once: income of the home country residents originating in the home country is naturally taxed only by the home country; income of residents of the home country originating abroad is taxed only by the home country; income of residents of the foreign country originating in

---

1/ The residence principle and the source principle are also referred to as the worldwide and territorial principles, respectively.

the home country is taxed only by the foreign country; and income of residents of the foreign country originating in the foreign country is naturally taxed only by the foreign country.

The difference between the residence principle and the source principle may also be viewed as the difference between taxing the Net National Product (*NNP*) and taxing the Net Domestic Product (*NDP*). If a country adheres to the residence principle, then the tax base in that country is its Net National Product *NNP* since, by definition, *NNP* of a country equals to its residents' world-wide income (net of foreign taxes). Similarly, if a country adopts the source principle, then the tax base in that country is its Net Domestic Product, since, by definition, *NDP* equals to the income produced by all factors of production employed in that country, regardless of the residency of their owners.

If countries do not adopt the same principle, a system of tax credits can alleviate the problem of double taxation. For instance, suppose that the home country adopts the residence principle and that the foreign country adopts the source principle as the basis for assessing tax liabilities. Suppose further that the home country allows a credit against taxes paid in the foreign country. In this case, if the foreign country's tax rate does not exceed the home country's rate, then the resident of the home country receives at home full credit against taxes paid abroad. In effect, the home country resident pays the same tax rate on domestic-source and foreign-source income. From the point of view of tax incidence, the tax credit in effect transforms the tax principle applied to residents of the home country to an effective residence principle applied to these residents'

(before-tax) world-wide income. The tax credit also brings the foreign country closer towards an effective source principle by reducing the combined tax rate (home and foreign) on non-residents' income in the foreign country. However, in the foreign country a non-resident pays a higher tax rate (the home country rate) than a resident. It is relevant to note, however, that even though the home country effectively adopts the residence principle, the tax base for revenue purposes is not its *NNP*. For the home country collects taxes according to its own rate on the domestic income of its residents but collects only the difference between the high home rate and the low foreign rate on the foreign-source income of its residents. The tax base for the foreign country in this case is still the *NDP* even though the income produced in that country is not subject to a pure source taxation.

If, however, the foreign tax rate is higher than the domestic rate, then a resident of the home country often does not receive a refund for the excess foreign tax credit. 1/ Hence, in effect the resident pays the foreign tax rate on foreign-source income. In this case therefore, the tax credit does not fully restore an effective residence taxation in the home country (even though it moves the home country closer to such a principle). It does, however, fully restore an effective source principle in the foreign country. In this case too, the tax base for revenue purposes in the foreign country is exactly *NDP* but in the home country the tax base is not equal to the *NNP*.

1/ Italy is a notable exception.

2.2. Common Practice

For tax purposes countries may treat individuals differently than corporations. In most of the industrialized countries, individuals are taxed according to the residence principle. That is, they are taxed by the home country on their foreign-source (capital) income while at the same time the foreign country usually exempts non-residents (or withholds tax at relatively low rates, below 15 percent). As Table 2.1 demonstrates, most countries tax their resident corporations according to the world-wide income, but they tax also the income of non-resident corporations. A system of credits or deductions usually supplements the tax systems in these countries and, in some cases, the source principle applies under a bilateral treaty. A few countries apply predominantly the source principle to their resident corporations by exempting their foreign-source income.

A deduction means that the tax paid abroad is deducted from taxable income in the home country while a credit means that the tax paid abroad is deducted from the tax liability in the home country. A deduction, however, affords a smaller relief for double taxation than a credit. For example, suppose that a corporation earns a gross income of 100 ECU in a foreign country on which 30 ECU are paid as a tax to the foreign government. Suppose further that the tax rate in the home country is 40 percent. Under a deduction system, the tax liability of this corporation at home is a 40 percent tax on 70 ECU. That is, the corporation pays at home an additional tax of 28 ECU, ending up with a net income of 42 ECU. Under a credit system, however, the tax liability of this corporation in the home country is 40 percent of 100 ECU, which is 40 ECU. But the corporation

receives a tax credit of 30 ECU and hence pays only 10 ECU to the home government, ending up with a net income of 60 ECU.

2.3. Feasible National Tax Systems

The possibility for a resident in one country to invest in other countries brings up the issue of international tax arbitrage. Such arbitrage has important implications for the viability of equilibrium in the capital markets.

To highlight this issue, consider again the standard two-country world (home and foreign) with perfect capital mobility and denote interest rates in the home and the foreign countries by r and r^*, respectively. In general, the home country may have three different effective tax rates applying to interest income:

(i) τ_{rD} - tax rate levied on residents on their domestic-source income;

(ii) τ_{rF} - effective tax rate levied on residents on their foreign-source income in addition to the tax already levied in the foreign country.

(iii) τ_{rN} - tax rate levied on non-residents on their interest income originating in the home country.

Correspondingly, the foreign country may also have three tax rates which we denote by τ^*_{rD}, τ^*_{rF}, *and* τ^*_{rN}. Note that $\tau_{rF} + \tau^*_{rN}$ *and* $\tau^*_{rF} + \tau_{rN}$ are <u>effective tax rates</u> on foreign-source income of the home country residents and of the foreign country residents, respectively, after tax credits and deductions have already been taken into account. (If a refund is offered in the home country for excess foreign tax credits, then τ_{rF} is

negative, and similarly for τ^*_{rF}.) In what follows we assume that these tax rates apply symmetrically to both interest receipts and interest payments (i.e., we allow for deductibility of interest expenses, including tax rebates).

With complete integration of capital markets between the two countries (including the possibility of borrowing in one country in order to invest in the other country), arbitrage possibilities imply that

$$r(1 - \tau_{rD}) = r^*(1 - \tau^*_{rN} - \tau_{rF}) \tag{1}$$

and

$$r(1 - \tau_{rN} - \tau^*_{rF}) = r^*(1 - \tau^*_{rD}). \tag{2}$$

Equation (1) applies to the residents of the home country. It implies that in equilibrium these residents are indifferent between investing at home or abroad. If this equality was violated, then the home-country residents could borrow unlimited amounts in the low (net of tax) interest rate country and invest these borrowed funds in the high (net of tax) interest rate country, thereby generating unlimited profits. Similarly, equation (2) which applies to residents of the foreign country, rules out such unlimited profit opportunities to foreign residents.

Equations (1) - (2) form a linear and homogenous system in two unknowns (r *and* r^*). Hence, if the world capital market equilibrium is <u>viable</u> (in the sense that pre-tax interest rates are positive) then the tax rates in the two countries must fulfill the following joint constraint involving tax rates of both countries:

$$(1 - r_{rD})(1 - r^*_{rD}) = (1 - r^*_{rN} - r_{rF})(1 - r_{rN} - r^*_{rF}). \tag{3}$$

The constraint, which involves tax rates of different tax jurisdictions, implies that even though the two tax authorities do not explicitly coordinate their tax systems between them, each one nevertheless must take into account the tax system of the other.

Noteworthy is the fact that the two polar principles (the source and the residence principles) are examples of <u>feasible tax structures</u>, provided that the two countries adopt the same principle. To illustrate, consider first the case in which both countries adopt the source principle. Since that principle implies that income is taxed only according to its source, regardless of residency it follows that

$$r_{rD} = r_{rN}\ ,\ r^*_{rD} = r^*_{rN} \quad \text{and} \quad r_{rF} = r^*_{rF} = 0\ . \tag{4}$$

Evidently, with these equalities, the joint constraint of equation (3) also holds and therefore the world equilibrium is viable.

Consider next the case in which both countries adopt the residence principle. Since in this case income is taxed only according to the place of residency, regardless of its source, it follows that

$$r_{rD} = r^*_{rN} + r_{rF}\ ,\ r^*_{rD} = r_{rN} + r^*_{rF} \quad \text{and} \quad r_{rN} = r^*_{rN} = 0. \tag{5}$$

Again, with these equalities the joint constraint in equation (3) holds and world equilibrium is also viable. 1/

However, if the two countries do not adopt the same effective principle, then equation (3) need not hold and therefore, a viable equilibrium may not exist. To see this, suppose, for instance, that the home country adopts in effect the residence principle while the foreign country adopts in effect the source principle so that

$$r_{rD} = r^*_{rN} + r_{rF} \text{ and } r_{rN} = 0 \,, \tag{6}$$

and

$$r^*_{rD} = r^*_{rN} \text{ and } r^*_{rF} = 0.$$

Hence, unless the foreign country levies no taxes whatsoever so that $r^*_{rD} = r^*_{rN} = 0$ (recall that $r^*_{rF} = 0$ by (6)), the joint constraint in equation (3) does not hold. Of course, if at least one of the two countries does not employ one of the two pure principles, then, again, (3) need not hold. These examples underscore the added constraints that integrated world capital markets impose on national tax structures. At the same time they also provide rationale for either detailed international tax coordination or adherence to (the same) pure principle of international taxation.

1/ Notice that the last set of equalities in equation (5) (namely, $r_{rN} = r^*_{rN} = 0$) is not necessary for the joint constraint (2) to hold. This means that for a viable equilibrium to hold it suffices that each country taxes its residents according to the residence principle and, at the same time, levies taxes on nonresident incomes, provided that each country offers appropriate foreign tax credits with refunds for excess credits.

2.4. Efficiency

In a world with international capital mobility, the equality between saving and investment need not hold for each country separately, but rather for world aggregate saving and investment. This separation brings out the issue of the efficiency of the international allocation of the world investments and savings.

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 there are two additional types of distortions which can be caused by capital income taxation: (i) international differences in intertemporal marginal rates of substitution (after-tax interest rates), implying an inefficient allocation of world savings across countries; (ii) international differences in the marginal productivity of capital (before-tax interest rates), implying that world investment is not efficiently allocated across countries.

It is worth studying the implications of the two pure principles of taxation (residence and source) for the global allocation of savings and investments. Recall that according to the residence principle, residents are taxed on their world-wide income equally, regardless of whether the source of the income is domestic or foreign. Recall that at equilibrium, a resident in any country must earn the same after-tax return, no matter to which country he chooses to channel his savings (the rate-of-return arbitrage). If a country adopts the residence principle, by effectively taxing at the same rate capital income from all sources, then

the before-tax 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, then capital income taxation does not upset the equality of the marginal product of capital across countries. Formally, the residence principle, when in effect in the home and the foreign country, is specified in condition (5). Substituting this condition into the (after-tax) rate of return equalization within countries (that is, conditions (1) - (2)), yield the (before-tax) rate of return equalization between countries: $r = r^*$. However, if the tax rates are not the same in all countries then the net returns accruing to savers in different countries vary (i.e., $(1 - t_{rD})r \neq (1 - t^*_{rD})r^*$) and the international allocation of world savings is distorted.

According to the source 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 the home country earns in the foreign country the same net return as the resident of the foreign country earns in the foreign country. Since a resident in the home country must earn the same net return whether he channelled his savings to the home country or to the foreign country, it follows that residents of all countries earn the same net return. Thus, intertemporal marginal rate of substitutions are equated across countries, implying that the international allocation of world savings is efficient. Formally, the source principle is specified by condition (4). Substituting this condition into the

arbitrage conditions, (1) - (2), yields the (net of tax) rate of return equalization between residents of different countries: $r(1 - \tau_{rD}) = r^*(1 - \tau^*_{rD})$. However, if the tax rate are not the same in all countries (i.e., $\tau_{rD} \neq \tau^*_{rD}$), then $r \neq r^*$ and the international allocation of the world stock of capital is not efficient.

The inefficiencies of the world aggregate investments or savings are depicted in Figures 1 and 2. Suppose that the world stock of capital is given. In Figure 1 this stock is depicted on the horizontal axis. The home country's capital (K) is measured in a rightward direction, starting at point 0 while the foreign country's capital (K^*) is measured in a leftward direction, starting at point 0^*. The curves labelled MPK and MPK^* describe the marginal products of capital in the home and the foreign country, respectively. Under the source principle, with different tax rates in the two countries, the before-tax rates of return, r and r^*, are not equated to each other (even though $(1 - \tau_{rD})r = (1 - \tau^*_{rD})r^*$). The equilibrium allocation of capital in this case will be at a point such as T, with a future (world) output loss of ABC. Under the residence principle, $r = r^*$ and the equilibrium allocation of the world stock of capital is at point S, where the world's future output is maximized, for the given stock of capital. (Obviously, the equilibrium world stock of capital itself is different when the residence principle applies than when the source principle applies.)

The equilibrium allocation of world savings is depicted in Figure 2. Suppose that the present world output is given. Suppose further that the world's total investment (= saving) and the international

distribution of investment have already been determined. Thus, aggregate (world) present and future consumption are given. Consider then the well-known Edgeworth box in Figure 2, with a representative consumer for each country. Under the residence principle, with different tax rates in the two countries, the (net of tax) rates of interest are not equalized; i.e., $(1 - \bar{t}_{rD})r \quad (1 - \bar{t}^*_{rD})r^*$, even though $r = r^*$. Equilibrium in this case is at a point such as A, outside the contract curve. Global saving is inefficiently allocated between the representative residents of the two countries. Accordingly, if the home country resident saves less by increasing his present consumption by an amount EF while the foreign country resident saves more by the same amount, then the equilibrium can move to point B, where both residents are better-off. Under the source principle, net-of-tax rates of interest are equalized in the two countries and the equilibrium will be at point on the contract curve (such as point B). The allocation of world's savings is efficient. (Obviously, the equilibrium volume of world savings are generally different under the two modes of taxation.)

3 Indirect Taxation: Destination versus Source

3.1. Basic Principles

Apart from border taxes (e.g., tariffs), the international implications of indirect taxation lie primarily with the value-added tax (*VAT*). This broad-based tax is very common in Europe and other countries and serves as a major revenue source for governments. Table 2 describes concisely the major features of the *VAT* in the European Community.

The Table shows that the VAT provides between 13 to 27 percent of all tax revenues in those countries.

As the name suggests, the VAT is levied on the value-added of the firm. The administrative technique usually employed is to levy a tax on the full value of goods and services sold by the firm (i.e., to levy a tax on the revenue of the firm) and then to allow a credit (with a refund) for the taxes included in the prices of all the intermediate goods and producible services purchased by the firm (i.e., except for labor and capital services employed directly by the firm). Since the gross value-added of a firm is defined as revenue minus cost of intermediate goods and producible services, it follows that the tax is generally levied on the gross value-added of the firm. Since the sum of the gross value-added of all domestic firms is equal to Gross Domestic Product (GDP), then, in principle, the VAT base is GDP. 1/ There are, however, two major exceptions. The first exception concerns capital goods. They are treated as intermediate goods and thus are exempted from the tax base. This exception brings the base of *VAT* to be equal to GDP minus gross investment. The second exception concerns the treatment of exports and imports. We elaborate on this point now.

Analogous to the residence and source principles governing direct taxation, there are the destination and source principles in the case of *VAT*. 2/ A country which employs the destination principle levies the

---

1/ With no loss of generality, it is assumed that the product of the government sector is also taxed.

2/ The source principle is also called the origin principle, in the case of indirect taxation.

VAT on all goods and services destined for final consumption in that country, regardless of the source of production. Therefore, exports are exempted 1/ while imports are taxed. Hence, the destination-based VAT is essentially a consumption tax. In contrast, a country which adopts the source principle levies the tax on all goods and services produced in that country, irrespective of their final destination. Therefore, exports are taxed while imports are exempted. Hence the source-based VAT is essentially a tax on GDP, minus gross domestic investment.

Suppose a good is produced in the home country and then exported to a foreign market. Under the source principle the value added would be taxes at home, regardless of the point of sale. Under the destination principle the value added would be exempted from home tax if the good is shipped directly, and taxed immediately upon arrival in the foreign country, if that country also follows the destination principle. For exported goods with intermediate domestic value added and sales, the destination principle would call for a tax on initial sales of the intermediate goods and then a rebate of these taxes upon export of the final good. 2/

1/ More precisely, exports are zero-rated rather than exempted. When a good is merely exempted from VAT, then no refund is offered to the producer for the VAT on the intermediate goods used in the production of the good. When exports are zero-rated, then not only the value-added of the exporting firm is exempted, but rather also the value-added of the firms producing the intermediate goods embodied in the exported good. Thus, the total value of exports is excluded from the VAT base in this way.

2/ This is accomplished, as explained in the preceding footnote, by imposing a zero-rate VAT on exports.

3.2. Common Practice

Currently, most countries apply the destination principle to their *VAT* systems. That is, they exempt exports and tax imports. In order to enforce this principle, most countries resort to border controls, where *VAT* is levied on imports; while exports are reported directly by the exporting firms. An exception is the Benelux countries which do not have border controls among them. Still, the destination-based *VAT* is enforced through reporting by the importing firms. The European Community which will eliminate fiscal frontiers in 1992 is currently scheduled to maintain the destination principle, employing the Benelux model for administering this principle. However, the currently agreed proposal is for the *EC* to shift to the source principle in 1997, with some kind of a clearing house for compensating or taxing member countries for revenue losses or gains resulting from the change in the *VAT* base. Even under this arrangement the European Community will still maintain the destination principle vis-á-vis the rest of the world.

3.3. Feasible *VAT* Principles

Similarly to international capital flows which dictate after-tax rate of return equalization within countries, free trade in goods and services dictates after-tax goods' price equalization within countries. This imposes some constraints on national *VAT* systems.

In order to see this point, consider again a two-country world (home and foreign) with a free trade in goods and services. Denote by p the producer price of a certain tradable good in the home country, expressed in terms of a common (to both the home and the foreign country), untaxed

numéraire, say labor (or capital).1/ In principle, the home country may have three different (ad valorem) tax rates applied to the good:

(i) τ_D - tax rate levied on the good if produced domestically and sold domestically;

(ii) τ_X - tax rate levied on exports of the good;

(iii) τ_M - effective tax rate levied on the imported good (in addition to the tax levied abroad).

Consider now a consumer in the home country who can purchase the good either from home production or from foreign production. If the good is produced in both countries, then the after-tax price to the home country consumer must be the same regardless of the country of production. That is:

$$p(1 + \tau_D) = p^*(1 + \tau_X^* + \tau_M), \tag{7}$$

where an asterisk stands for the foreign country.

A similar after-tax price equalization condition applies for the consumer in the foreign country, that is:

$$p(1 + \tau_X + \tau_M^*) = p^*(1 + \tau_D^*). \tag{8}$$

Thus, if the good is produced and consumed in both countries, both equations (7) and (8) must hold. Since the *VAT* applies to all goods, then as long as there is at least one good which is produced and consumed in both countries, it follows that

---

1/ The choice of a common numeraire for both countries implicitly assumes that the numeraire good is internationally mobile.

$$(1 + \tau_D)(1 + \tau_D^*) = (1 + \tau_X^* + \tau_M)\ (1 + \tau_X + \tau_M^*). \qquad (9)$$

Otherwise, the only solution to (7) - (8) is $p = p^* = 0$, which is impossible. Thus, a joint constraint involving the tax rates in the two countries is crucial for the existence of an equilibrium in which there is at least one good which is produced and consumed in both countries.

As with direct taxes, either one of the two polar principles, destination and source, meets the joint constraint (9), if adopted by both countries. For instance, the destination principle, if adopted by both countries, is specified by

$$\tau_D = \tau_X^* + \tau_M,\ \tau_D^* = \tau_X + \tau_M^*, \text{ and } \tau_X = \tau_X^* = 0 \qquad (10)$$

Similarly, the source principle, if adopted by both countries is specified by

$$\tau_D = \tau_X,\ \tau_D^* = \tau_X^*, \text{ and } \tau_M = \tau_M^* = 0. \qquad (11)$$

It is straightforward to verify that the joint constraint (9) is satisfied, if either (10) or (11) holds. However, as in the case of direct taxation, a mixture of the two polar principles (either by the same country or by the two countries) may violate the joint constraint (9) and consequently may be infeasible.1/

1/ If, however, factors of production are internationally immobile the two polar tax principles are quivalent. See, Eitan Berglas (1974), "Devaluation, Monetary Policy, and Border Tax Adjustment," Canadian Journal of Economics, Vol. VII, No. 1, pp. 1-11.

3.4. Efficiency

Obviously, in a world with international trade in goods and services, the equality between production and consumption need not hold for each country separately, but rather for world aggregate production and aggregate consumption. In a closed economy, an excise tax drives a wedge between the producer price and the consumer price. In an integrated world economy there are two additional types of distortions caused by a uniform, broad-based, *VAT*. These distortions arise from: (i) international differences in consumer marginal rates of substitution between commodities, implying an inefficient allocation of world consumption; (ii) international differences in producer marginal rates of transformation between commodities, implying that world output is not efficiently produced.

If both countries adopt the residence principle, then (10) holds, and it follows from (7) and (8) that $p = p^*$ for all tradable goods. That is, the relative producer price between any tradable good (or all tradable goods grouped together as an aggregate consumption good) and labor (or capital) is equalized across countries. Profit-maximization implies that the business sector equates the relative producer price between any tradable good and labor to the marginal rate of transformation between them (i.e., to the inverse of the marginal product of labor in the production of that tradable good). Hence, labor has the same marginal product in the production of any tradable good in both countries. That is, world aggregate production efficiency prevails: world's production is on the world's aggregate production possibility frontier. However, if the VAT rates differ in the two countries, then the relative consumer price between

any tradable good and leisure is not equated across countries and the allocation of world's consumption (of leisure and of tradable goods) is inefficient.

Similarly, if both countries adopt the source principle, equation (11) holds. It then follows from equations (7) and (8) that $p(1 + \tau_D) = p^* (1 + \tau_D^*)$, for all tradable goods. That is, the relative consumer price between any good and leisure is equalized across countries. Utility-maximization implies that the relative consumer price between any tradable good and leisure is equated to the marginal rate of substitution between them. Hence, these marginal rates of substitution are equalized internationally. That is, the allocation of world's consumption (of leisure and of tradable goods) is efficient. However, if the VAT rates are not the same in all countries, then the relative producer prices are not equalized internationally. That is, the marginal products of labor in the production of the same tradable good are not equalized internationally and aggregate production is inefficient.

The inefficiencies of the world's allocation of production and consumption are depicted in Figures 3 and 4. Under the source principle, the relative consumer price of any tradable good (or all tradable goods grouped together into an aggregate consumption good), in terms of the numéraire leisure, is the same in the home and the foreign country. But the marginal products of labor in producing this good (denoted by MPL and MPL* for the home and the foreign country, respectively) differ between the two countries. Figure 3 depicts the production inefficiency that arises in this case. Let OO^* be the total labor input employed in the production

of the tradable good in the two countries. Let L and L^* be the labor input employed in the production of the tradable good in the home and the foreign country, respectively. Suppose, for the sake of concreteness, that $MPL^* > MPL$, so that the allocation of world's labor is at a point such as T. Recall that the consumer marginal rates of substitution between the tradable good and leisure are the same in the two countries. That is, the consumer marginal valuation of leisure in terms of the tradable good is the same in the two countries. Hence, if a representative consumer in the foreign country works for an additional unit of labor and a representative consumer in the home country reduces his work effort by one unit, then an appropriate transfer of the tradable good (equaling the common marginal valuation of leisure) can be made from the representative consumer in the home country to the representative consumer in the foreign country, so as to leave both consumers indifferent. But, since the marginal product of labor is higher in the foreign country, these compensated changes in the labor supply increase total output of the tradable good, making it possible to increase the welfare of the consumer in both countries. This shows that world's production of the tradable good is inefficient. In fact, the total output loss incurred at the inefficient point T is equal to the area of the triangle ABC.

Under the destination principle, the marginal products of labor in the production of the tradable good are equalized across countries. But the marginal rates of substitution between the tradable good and leisure are not equalized internationally. The consumption inefficiency that arises in this case is described by the familiar Edgeworth box depicted in Figure 2.4 with

consumption of leisure and of the tradable good is represented by a point such as A, off the contract curve. Since the marginal product of labor is the same in both countries, then increasing the labor supply of the home country and reducing the labor supply of the foreign country by the same amount will leave total output of the tradable good unchanged. But then there exists a transfer of the tradable good from the foreign country to the home country to accompany these changes in the labor supply of each country, so as to shift the allocation to a point on the segment CD of the contract curve and, making consumers in both countries better-off.

Notice nevertheless that the aforementioned production and consumption inefficiencies, which are the hallmark of trade taxes such as an import tariff, do not exist <u>within</u> the set of tradable goods. As long as the VAT rate is <u>uniform</u> on all goods, these inefficiencies may arise only between the whole set of tradable goods (or any good within this set) and labor or leisure. To see this, consider any two tradable goods, i *and* j. When the VAT rate is uniform, then the consumer price ratio between these goods, $p_i(1 + \tau_D)/p_j(1 + \tau_D)$, is equal to the producer price ratio, p_i/p_j. Similarly, in the foreign country, $p_i^*(1 + \tau_D^*)/p_j^*(1 + \tau_D^*) = p_i^*/p_j^*$. If both countries adopt the destination principle, then, the producer price ratios are equal in the two countries (i.e., $p_i/p_j = p_i^*/p_j^*$) and it follows that the consumer price ratios are also equal (i.e., $p_i(1 + \tau_D)/p_j(1 + \tau_D) = p_i^*(1 + \tau_D^*)/p_j^*(1 + \tau_D^*)$). Thus, within the set of tradable goods, both production and consumption are efficient. Similarly, if both countries adopt the source principle, then their consumer price ratios are equalized and it follows that their producer price ratios are equalized too. Again,

within the set of tradable goods, both production and consumption are efficient.

Table 1

Taxation of Foreign-Source Capital Income - Selected Countries

				Corporate
Country	Top Individual Tax Rate (%)	Dominant Tax Principle	Top Corporate Tax Rate (%)	Dominant Tax Principle
European Community:				
Belgium	55	R	43	S
Denmark	68	R	50	R (with Credit)
France	53	R	39	S
Germany	56	R	56	R (with Deduction 1/
Greece	50	R	35	R (with Credit)
Ireland	58	R	43	R (with Credit or Deduction)
Italy	50	R	46	R (with Credit) 2/
Luxembourg	56	R	36	R (with Credit)
Netherland	72	R	36	R (with Credit or Deduction) 1/
Portugal	40	R	36	R (with Credit)
Spain	56	R	35	R (with Credit)
U.K.	60	R	35	R (with Credit)
Canada	42 - 49 3/		38	
Japan	50		42	
U.S.	28 - 38 4/	R	34	R (with Credit)

Source: a. Lans Bovenberg and George Kopits, "Harmonization of Taxes on Capital Income and Commodities in the European Community," IMF, October, 1989.

b. Individual Taxes: A Worldwide Summary, Price Waterhouse (1989).

1/ The source principle applies under treaties and for substantial participation in foreign companies.

2/ With refund for excess foreign tax credit.

3/ Including provincial taxes.

4/ Including state taxes.

Table .2 Value-Added Taxes in the European Community

Country	Year of Introduction	Statutory Rates 1/				VAT as Percent of Tax Revenue 2/	VAT as Percent of GDP 2/
		Standard rate	Increased rate	Reduced rate	Scope of Zero Rate		
Belgium	1971	19	25, 33	1, 6, 17	Newspapers	16.3	7.2
Denmark	1967	22	--	--	Newspapers, large ships and aircraft	26.9	
France 3/	1968	18.6	25	5.5	--	20.9	8.7
Germany, Fed. Rep. of	1968	14	--	7	--	13.1	3.8
Greece 4/	1987	16	36	3, 6	--	20.9	7.8
Ireland	1972	23	--	0, 5, 10	Wide range of items	18.9	8.0
Italy	1973	19	38	4, 9	Newspapers, and some minor items	13.1	4.7
Luxembourg	1970	12	--	3, 6	--	13.3	6.0
Netherlands	1969	18.5	--	6	--	15.2	7.9
Portugal 5/	1986	17	30	8	Basic foods, newspapers, medicines, agricultural inputs	18.8	7.7
Spain	1986	12	33	6	--	16.0	5.3
United Kingdom	1973	15	--	0	Wide range of items	16.3	6.0

Sources: "EC: The Evolution of VAT Rates Applicable in the Member States of the Community," Intertax, (1987/3); International Bureau of Fiscal Documentation, Tax News Service, various issues; IMF, Government Finance Statistics Yearbook (1989), and OECD, Revenue Statistics of OECD MEMBER Countries, 1966-88 (Paris, 1989).

1/ As of July 1990.

2/ Data for 1987.

3/ France applies VAT rates of 2.1 percent to daily newspapers and some medicines, and 13 percent to sales and transfers of building land. Different VAT rates apply in Corsica.

4/ Different rates apply in Dodecanese.

5/ Different rates apply in the Azores and Madeira.

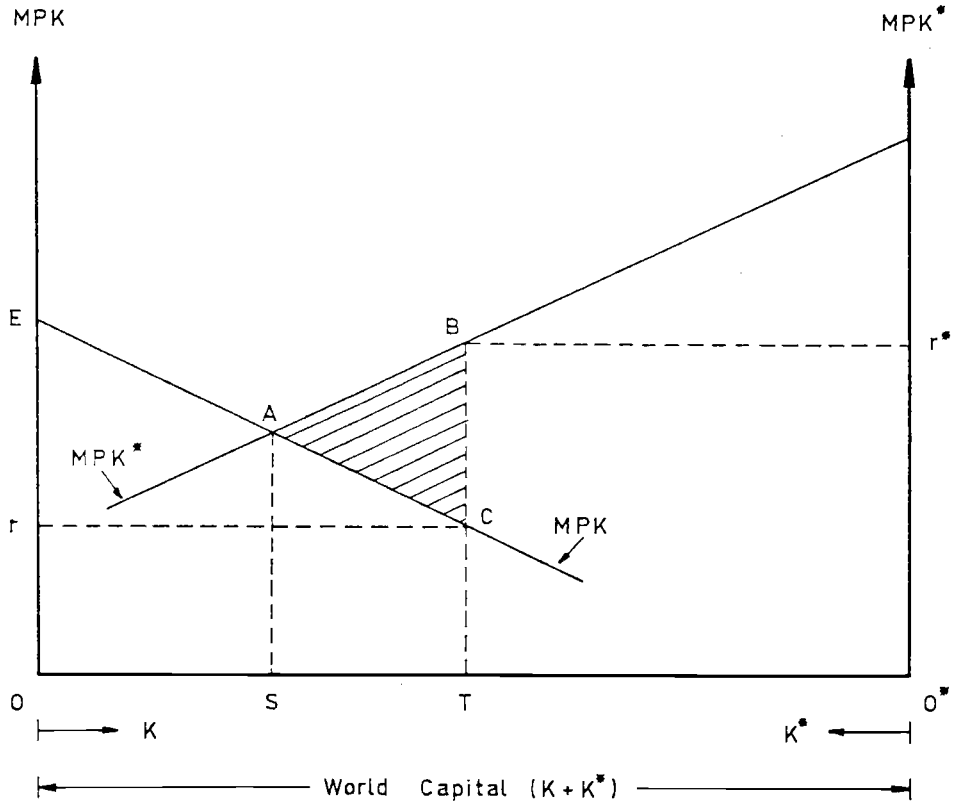

Figure 1: Allocation of World Capital .

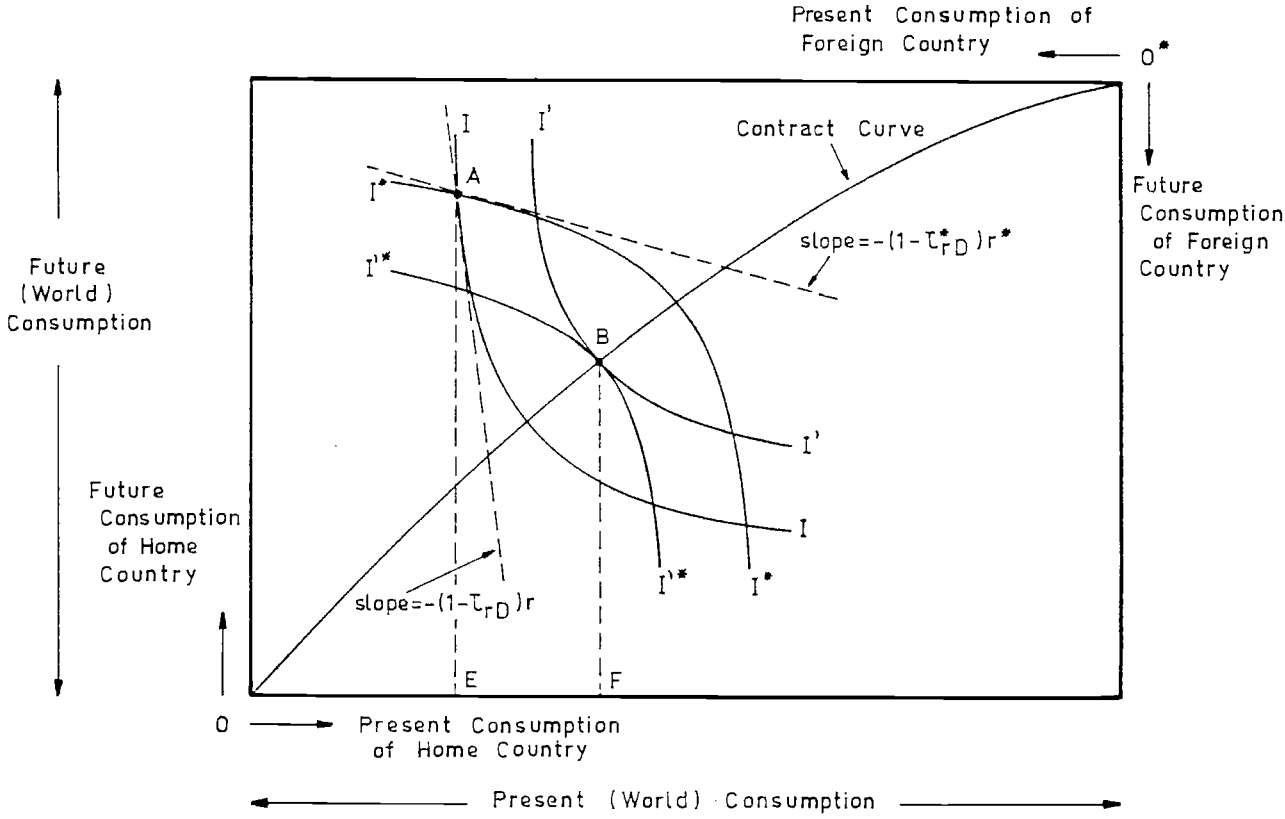

Figure 2: Allocation of World Saving.

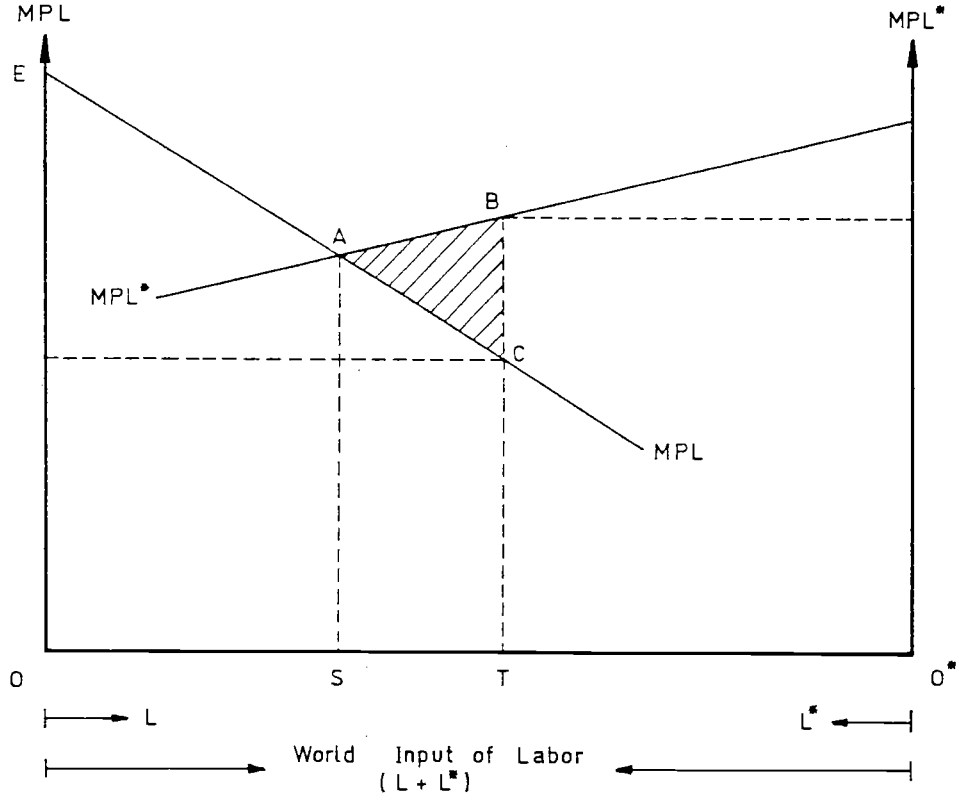

Figure 3: Allocation of World Input of Labor.

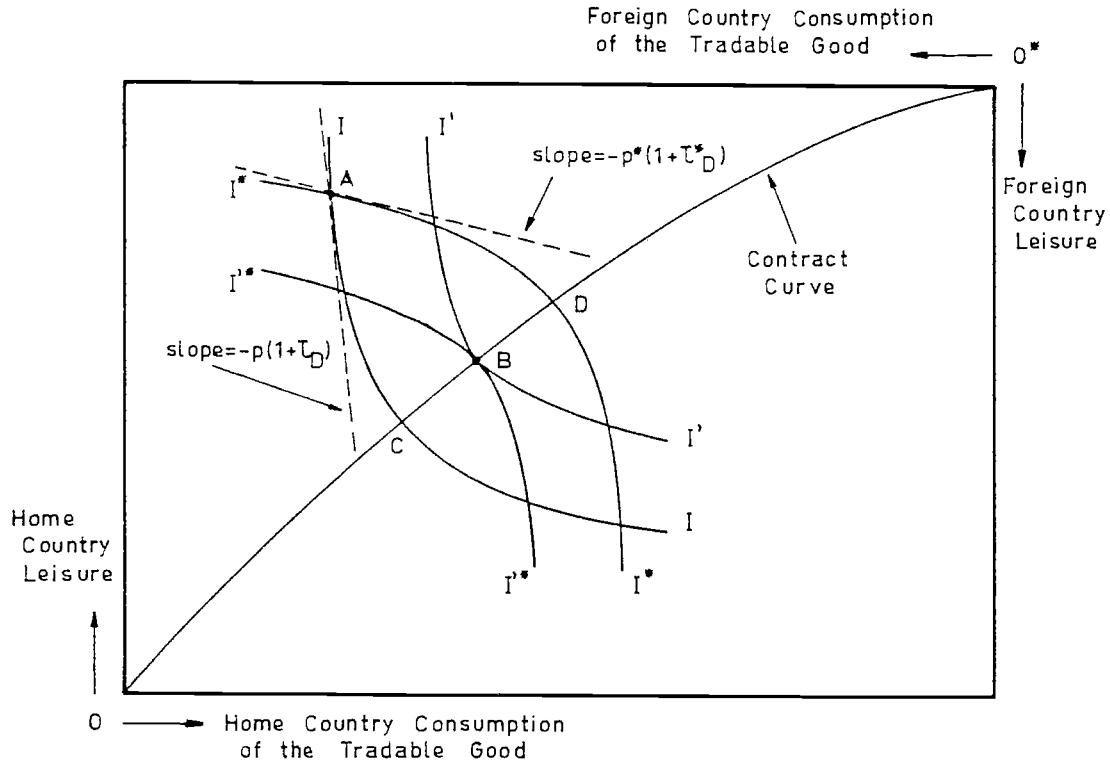

Figure 4: Allocation of World Consumption.

Selected References

Berglas, Eitan, (1974), "Devaluation, Monetary Policy, and Border Tax Adjustment," The Canadian Journal of Economics, Vol. VII, No. 1, pp. 1-11.

Diamond, Peter A., and James Mirrlees, (1971), "Optimal Taxation and Public Production," American Economic Review, March and June, pp. 8-17 and pp. 261-178.

Fisher, Irving, (1939), "The Double Taxation of Savings," American Economic Review, Vol. 29 (March), pp. 16-33.

Giovannini, Alberto, (1989), "National Tax Systems vs. The European Capital Market," paper prepared for the Economic Policy Panel, Paris.

Gordon, Roger H., (1986), "Taxation of Investment and Savings in a World Economy," American Economic Review, 76, pp. 1087-102.

Horst, Thomas, (1980), "A Note on the Optimal Taxation of International Investment Income," Quarterly Journal of Economics, 44, pp. 793-98.

King, Mervyn A. (1983), "The Economies of Saving," NBER Working Paper 1247 (Cambridge, Massachusetts: NBER) (December).

Kotlikoff, Lawrence J., (1989), What Determines Savings?, Cambridge, Massachusetts, MIT Press.

McLure, Charles E., (1986), "Tax Competition: Is What's Good for the Private Goose also Good for the Public Gander?," National Tax Journal, Vol. 39, (September), pp. 341-48.

Sinn, Hans-Werner, (1990a), "Tax Harmonization and Tax Competition in Europe," NBER Working Paper No. 3248, January.

Slemrod, Joel, (1988), "Effects of Taxation with International Capital Mobility," in Henry Aaron, H. Galper, and Joseph A. Pechman (eds.), Uneasy Compromise: Problems of a Hybrid Income-Consumption Tax, pp. 115-48, The Brookings Institution, Washington, D.C.

Tanzi, Vito, (1987), "Income Taxes, Interest Rate Parity, and the Allocation of International Savings in Industrial Countries," Working Paper 87/53, International Monetary Fund (August).