Chapter 9 International Issues in Public Finance

9.1 Introduction

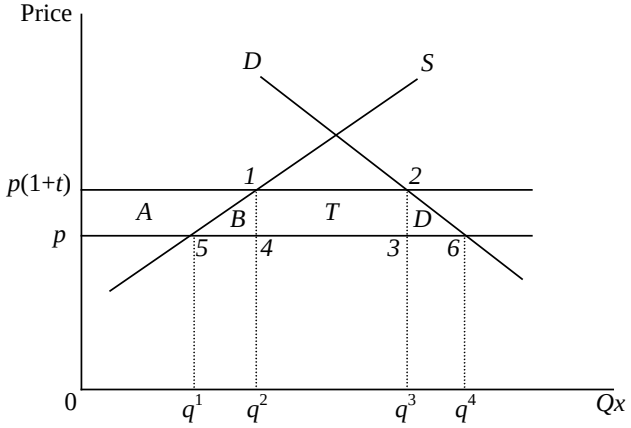
Trade taxes are a far more important component of central government revenue for developing countries than they are for developed countries, as you can see the differences in shares of trade taxes in total government revenues. In order to attract foreign direct investment, many countries engage in corporate tax competition which may end up with revenue loss without economic benefits. The growth of multi-national enterprises (MNEs) presents increasingly complex taxation issues for both tax administrations and the MNEs themselves since separate country rules for the taxation of MNEs cannot be viewed in isolation but must be addressed in a broad international context.

9.2 Trade versus Non-trade Taxes

If we were to compare the welfare costs of raising revenue by a tax on imports and by a consumption tax, the analysis would favor the more general consumption tax.

Figure 9.1 shows the home supply curve *S* for a product (good *x*) and the domestic demand curve *D*. The world price of imports is *OP*, so that up to quantity Oq^1 it is cheaper to produce the good at home than to imports. After this point, it is cheaper to import the good than to use resources producing an additional unit at home. At the price *OP* a total of Oq^4 is demanded so that imports are q^1q^4.

Figure 9.1 The Welfare Effect of a Tax on Imports



If an *ad valorem* import tariff of rate *t* is applied to imports, the price of imports rises from *OP* to *OP*(1+*t*). The quantity of imports falls to q^2q^3. Home production, protected by the tariff, rises from Oq^1 to Oq^2, whereas overall demand for the product falls from Oq^4 to Oq^3, as the price to the consumer rises. The tariff revenue is given by area 1234(*T*). The welfare losses incurred in raising this revenue are shown by triangle 145(*B*) and triangle 263(*D*). When the import tariff is introduced, the loss (*B*) occurs because the country uses up resources producing goods that are more cheaply imported. The welfare loss (*D*) arises because consumers reduce their demand for the good, even though they would willingly pay more under the free trade price. For units q^3 to q^4 willingness to pay exceeds *OP*, yet these units are still not consumed. The welfare cost arises because the tax distorts signals.

The tariff leads to a reduction in consumer surplus of (*A*)+(*B*)+(*T*)+(*D*). The home producer gains (*A*) as an increase in *producer surplus*, created by the fact that he can now charge *OP*(1+*t*) for his product and still compete with imports. The area (*T*) is a loss of *consumer surplus* but a gain to individuals as taxpayers, i.e. a transfer within society. The areas (*B*) and (*D*) are *deadweight losses*. This is the cost of raising (*T*) revenue.

Compare this means of raising government revenue with a general consumption tax of rate *t*. Note that the consumption tax is applied to both home production and imports, thus it is less discriminatory, i.e. home production is not artificially favored by a general consumption tax. Therefore, there is no loss of area (*B*). Total tax revenue is now equal to (*A*)+(*B*)+(*T*). Clearly the welfare losses per unit of revenue raised have decreased greatly from that of tariff.

From theoretical point of view, a general consumption tax is superior to trade tax (tariff). Nevertheless there are arguments that emerge to explain why some countries might use trade taxes as a revenue raiser.

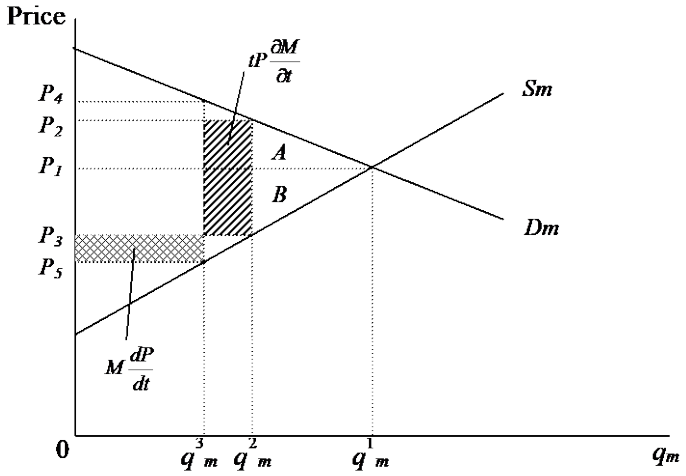
The optimum tariff argument

This argument relies on the assumption that a country may have an effect upon the *terms of trade* as a result of its own trading activity.

Let us consider Figure 9.2. The supply of imports *Sm.* is upward-sloping. The demand for imports is *Dm.* If there were free trade the total quantity of imports of commodity *X* would be Oq_m^1 at a price of OP_1. If a tax were introduced, there would be a difference between the price at which imports were bought (P_3) and the price at which consumers purchased the good (P_2). Assume a tax at rate t_1, so that the price to consumers is P_2 (i.e. the import price OP_3 multiplied by $(1+t_1)$). Imports will be Oq_m^2, the price to consumers becomes OP_2 and the price of imports to the country is OP_3. It is apparent that cutting the demand for imports has reduced the price of imports to the country from OP_1 to OP_3. There are deadweight losses

associated with this tax, triangles (*A*) and (*B*).

Figure 9.2 An Optimal Import Tax



(*A*) is a loss to the country that imposes the tax, in so far as residents of that country have lost consumer surplus on the units of imports no longer imported. (*B*) is a loss to the exporting country, which no longer sells these units. The importing country has lost (*A*) but it has gained the remaining imports at a lower price; i.e. there is a cost reduction of $(OP_1 - OP_3)(Oq^2{}_m)$ and this outweighs (*A*). This is a transfer from the exporting country.

The importing country has a reason to introduce the tax. Assume the rate of tax is raised to t_2. The wedge between import prices and consumer prices will increase to $OP_4 - OP_5$. There are additional losses borne by the importing country (in terms of the consumer surplus loss on the units no longer imported, i.e. $Oq^2{}_m - Oq^3{}_m$). These additional losses are approximated by the expression $tP(\partial M/\partial t)$, where *tP* is the tax paid on the import reduction, $\partial M/\partial t$ brought about by the increase in tax. The additional gains are equal to the change in the import price (created by the tax increase) multiplied by the remaining imports, $M(dP/dt)$. It is worth changing the tax as long as the net marginal gains in welfare are positive; at the margin, the optimal tax rate is obtained,

$$M(\partial P/dt) - t^*P(dM/dt) = 0 \qquad (9.1)$$

solving for *t** yields

$$t^* = \frac{\partial P/dt}{\partial M/dt}\frac{M}{P} \qquad (9.2)$$

This is equivalent to

$$t^* = 1/e_s \tag{9.3}$$

where e_s is the elasticity of supply of imports to the country.

It is clear that tax revenue may be raised by the country while at the same time the welfare of the country is improved. The excess burden (deadweight losses) of the tax in this case is outweighed by the terms of trade improvement which the country experiences.

The tariff rate that maximizes this welfare for the country is that which equals the reciprocal of the elasticity of supply of imports. From the analysis above, exporters abroad stand to lose, and therefore they may be tempted to retaliate by reducing their demand for imports from this country. The prospect of a tariff war does not imply that the country which initiates the import tariff will necessarily lose, but it is an important consideration. At the end of a tariff war the terms of trade could still favor the instigator of the war, though the possibility that all would be worse off as a result is a very real threat.

Why is it that government intervention is now justified in the import sector? Why is free trade not maximizing the welfare of the country? The answer to these questions lies in the face that the supply price of imports does not represent the marginal cost of the country of additional imports.

The total cost of imports is equal to the import price *P*, multiplied by the quantity of imports *M*. The marginal cost of imports is

$$\frac{\partial(PM)}{\partial M} = P + M\frac{dP}{\partial M} \tag{9.4}$$

which can be written as

$$\frac{\partial(PM)}{\partial M} = P\left(1+\frac{M}{P}\frac{\partial P}{\partial M}\right) = P\left(1+\frac{1}{e_s}\right) \tag{9.5}$$

where e_s is the import price elasticity of supply of imports.

When an importer buys an additional import, the price to him is the cost of the import *P*, but the price to the country is this *P* plus the impact that the additional purchase has on the price of all other imports, i.e. $M(dP/\partial M)$. In a sense, the effects of decisions of an importer spillover to others who import the good. This is the distortion in the import sector that is corrected by the government.

Administration costs of tax collection

So far we neglect the costs of administering and collecting taxes. For tax collection it is important that the taxpayer and the tax base be readily identifiable. In countries that have substantial subsistence sectors, how can income be distinguished from consumption? For economies where there are many traders who are to be found in the informal sector and who may be itinerant, how are traders to be identified and checked? Far easier to concentrate upon a smaller number of importers who, at least, should have invoices relating to their business. For developing countries, this must be an important consideration.

International and revenue constraints

WTO was designed to reduce tariffs generally. Countries are less prepared to condone high tariffs when they are less subject to the problems experienced by developing countries. Moreover, it is argued that, as the revenue yield of trade taxes is inelastic with respect to the growth of income, countries inevitably may be forced to turn to other forms of revenue as they grow.

Import substitution policy

One of the oldest arguments in favor of tariffs is the 'infant industry' argument, which maintains that temporary protection may be necessary for new domestic industries which, after a period of learning, will acquire the skills necessary to make them viable competitors internationally. However, while this argument is readily put forward to defend the use of trade restrictions, there are very many problems with it.

First, the argument needs to be presented in such a way as to warrant government intervention, for example, existence of market imperfection and external economies.

Second, if there is a case for government intervention, should support to industry take other forms than import protection, e.g. industrial subsidies?

Third, if it can be shown that import tariffs are the best approach, will the potential benefits outweigh the costs of protection to be experienced during the period of protection?

Although these problems are well know, given considerations such as the weakness of capital markets and the difficulties of financing industrial subsidies in developing countries, import substitution may become an objective of developing countries.

9.3 Government Revenue and Smuggling

One argument in favor of smuggling is that, if typically trade taxes create welfare losses, then smuggling must be welfare-enhancing. Will smugglers enhance welfare if their activity reduces the deadweight losses associated with taxation?

Here we seek to show that smuggling will reduce welfare in circumstances where legal and illegal trade co-exist.

If smuggling co-exists with legal trade, then consumers would have an incentive to purchase the smuggled good up to the point at which the price of the smuggled good was just equal to the price of the legal import plus the tax on the legal import. Assume that the smuggler has increasing costs.

It is possible to compare the welfare position of the country when there is both smuggling and legal trade and when there is simply legal trade. There is a welfare loss associated with the smuggling because consumer trade has been diverted by the tax to a more expensive supplier. While the smuggler can match the legal price, this is only because of the effect of the tax. At least if the consumer bought the import legally, the tax paid would be available for the government to use in the economy. While the consumer does not perceive this advantage, it would be an advantage to the economy as a whole and far better than simply covering the additional costs assisted with smuggling. However there is a case for expenditure of resources to deter smugglers (see Bhagwati and Hansen (1973), Bhagwati and Srinivasan (1983)).

Smuggling is just one of many considerations that a government must evaluate when deciding how to set tariffs so as to maximize revenue.

9.4 The Harmonization of Indirect Taxes

One of the functions of border tax adjustments is to equalize the conditions of competition between different producers. Two principles of border tax adjustment are relevant:

The origin principle:

The good is taxed in the country in which it is produced and it continues to bear the tax of the country of origin, even though it is sold and consumed in another country – in effect there is no border tax adjustment.

The destination principle

There is border tax adjustment. The same sales tax will be imposed on imported goods as is imposed on domestically produced goods. Under this arrangement, goods which are exported are exempted from tax, so that, in turn, ultimately they will bear only the same sales tax as that imposed on other goods produced in the country to which exports are destined for consumption. This arrangement requires adjustment to taxes at national frontiers. Exported goods enjoy a rebate of tax in the country from which they are exported and then are taxed according to the rate of sales tax in the country to which they are destined.

Table 9.1 shows the equivalence of the destination and origin principle.

Table 9.1 Consumer Prices Relative to the Wage in Different Tax Regimes

Regime	Good X	Good Y
Origin		
Country A	$1+t_a$	$(1+t_b)W^0$
Country B	$\frac{1+t_a}{W^0}$	$1+t_b$
Destination		
Country A	$1+t_a$	$(1+t_a)W^d$
Country B	$\frac{1+t_b}{W^d}$	$1+t_b$

Source: Lockwood *et al*. (1995).

Country A produces good X and country B produces good Y under conditions of constant returns to scale. There is a single factor of production, labor (with wage inelastic supply). In each country one unit of labor is used to produce one unit of the good.

Labor in country A is taken as the numeraire, so that W_a=1 and W_b=W. A uniform tax rate in A is denoted by t_a and in B by t_b. The two regimes (origin and destination) can be regarded as equivalent if the prices are the same in both regimes, i.e. $W^d = W^0(1+t_b)/(1+t_a)$ where W^d refers to wages in the destination regime and W^0 refers to wages in the origin regime. For this equality to hold, either wages need to be flexible or exchange rates must adjust.

On the face of it, this analysis seems to suggest that there is no difference whether the destination or the origin principle of taxation are operative. But this conclusion depends on some assumptions;

Exchange rates are flexible.

In the origin principle, the mechanism which made the tax non-distortive was the change in the exchange rate of A's currency. If there are fixed exchange rates, this equilibrating mechanism is inoperative. When exchange rates are fixed, a change from the origin principle to the

destination principle by a country, acts as a subsidy to exports and implies a tax on imports. The result should be an improvement in the balance of trade.

The tax is general.

According to Musgrave and Musgrave (1989), if country *A* imposes *a general sales tax* then it has been shown that, under the destination principle, there are no trade effects. If country *A* had applied a *selective* tax to one good *Y*, the result would be that domestically, consumers would consume more of good *X* and reduce their consumption of good *Y*.

This adjustment may affect the level of trade in both of these commodities but it will not affect the location of production for both products. The destination principle will ensure that country *A* is not put at a competitive disadvantage in terms of good *Y*. The result is that there is a distortion created as far as consumption patterns between *X* and *Y* are concerned but there is no distortion in production.

If country *A* imposes *a general production tax* on goods *X* and *Y* and, if there is the *origin principle*, prices in *A* rise but, with a change in the value of the currency, there are no distortive losses. However, if *A* puts a production tax on one good *Y*, consumers in country *B* of good *Y* will see that the price of the good from *A* has risen and will substitute in favor of domestic production. As *B* imports less, the price of *A*'s currency will fall. Therefore, in *A* consumers find that the price of imports has increased and they import less. A new equilibrium is established. There is a lower level of trade and there is also an effect upon the location of production. Country *A* now produces more *X* and country *B* produces more *Y*.

No other factors affecting exchange rates.

Exchange rates must change only in response to competitiveness in trade. Therefore, from the initially balanced trade position exchange rates must be determined only by prices. There should be no net transfer payments, such as interest on debt, between countries. There should be no net flow of capital to a country.

Different principles applied to different products.

Assume that a tax of 20% will be applied to all goods in country *A*. But in this case assume that *A* applies that the origin principle to trade in *Y* and the destination principle to trade in *X*. *A* has a comparative advantage in *Y* but with the origin principle applying this will make its exports of *Y* more expensive and imports of *Y* less expensive. By contrast, imports of *X* will

carry the same sales tax as domestically produced units of *X*. This may distort the comparative cost position and, in the extreme, it could lead *A* to import *Y* and export *X* (for *X* will get the tax rebate when exported under the destination principle).

9.5 Residence - based vs. Source-based Capital Taxation

Principles of capital taxation and international production efficiency

International factor flows can either be taxed in the country where the income originates (*source principle*), or in the country where the factor owner resides (*residence principle*). In principle, this distinction applies to both labor and capital income. However, since we assume that labor is not mobile internationally, the discussion will be focused on capital taxation only. In the following, we compare the basic properties of residence-based vs. source-based capital taxation and introduce a theoretical criterion that allows a welfare ranking between them[1].

Residence principle

Under the residence principle, capital income is taxed in the country where the investor resides, irrespective of where the capital income has originated. Let the gross returns to capital in two countries $i \in \{A, B\}$ be denoted by r^i. A capital owner in country *A* comparing the net returns from domestic and foreign investments thus faces the international arbitrage condition

$$r^A(1-t^A) = r^B(1-t^A) \Rightarrow r^A = r^B. \tag{9.6}$$

Arbitrage by capital owners will thus equalize gross-of-tax returns across countries. From the profit-maximizing input choices of competitive producers, the gross return to capital will equal the marginal productivity of capital $(\partial f^i / \partial k^i)$ in each country. Hence we have

$$\frac{\partial f^A}{\partial k^A} = r^A = r^B = \frac{\partial f^B}{\partial k^B}, \tag{9.7}$$

so that marginal productivities of capital are equated across countries. This leads to an efficient allocation of investment worldwide and is also referred to as *capital export neutrality*. At the same time, the net returns to capital will differ across countries when $t^A \neq t^B$. By the

[1] For a more detailed introduction to the properties of international principles of capital taxation, see Frenkel, Razin and Sadka (1991, ch.2).

consumers' intertemporal optimization, the net return to capital will equal the marginal rate of substitution between consumption today (c_0), and consumption tomorrow (c_1), so that

$$\frac{\partial u^A / \partial c_0^A}{\partial u^A / \partial c_1^A} = 1 + r^A(1-t^A) \neq 1 + r^B(1-t^B) = \frac{\partial u^B / \partial c_0^B}{\partial u^B / \partial c_1^B} \qquad \text{if } t^A \neq t^B.$$

Hence, when tax rates differ across countries, an inefficient allocation of world savings will result under the residence principle.

Source principle

Under the source principle, capital incomes are taxed in the country where the investment takes place, irrespective of the nationality of the investor. This will occur either if the residence country of the investor exempts the foreign-earned income from tax, or if it grants a limited tax credit, and the tax rate in the host country exceeds the tax rate in the residence country of the investor (see below). The international arbitrage condition for capital owners in each country is then given by

$$r^A(1-t^A) = r^B(1-t^B). \tag{9.8}$$

When tax rates differ across countries, gross-of-tax returns and hence marginal productivities of capital will thus differ internationally and investment decisions are distorted:

$$\frac{\partial f^A}{\partial k^A} = r^A \neq r^B = \frac{\partial f^B}{\partial k^B} \qquad \text{if } t^A \neq t^B. \tag{9.9}$$

At the same time, net returns to capital are equalized across countries. This property is also known as *capital import neutrality*, since taxes levied do not depend on the country from which the capital is imported. Equating net returns to the marginal rate of intertemporal substitution shows that the allocation of world savings is efficient:

$$\frac{\partial u^A / \partial c_0^A}{\partial u^A / \partial c_1^A} = 1 + r^A(1-t^A) \neq 1 + r^B(1-t^B) = \frac{\partial u^B / \partial c_0^B}{\partial u^B / \partial c_1^B}.$$

It is immediately clear from our above discussion that internationally efficient investment and savings decisions can be expected only when tax rates are equalized across countries. This forms one of the basic efficiency reasons for the international harmonization of tax rates

on capital. It is equally clear, however, that tax rate harmonization will impose substantial costs on countries with diverse structures and levels of capital taxation. Taking different national capital tax rates as given, the theoretical comparison between the residence and the source principle of capital taxation reduces to the question of which principle implies the lower welfare costs of international tax rate diversity.

In a partial equilibrium framework, this question was first addressed by Horst (1980). Horst assumed that both taxes can be used simultaneously and argued from standard optimal tax reasoning that the residence-based tax should be high, relative to the source-based tax, when the elasticity of the supply of capital (i.e. savings) is lower than the elasticity of capital demand. He also discussed the special case of fixed domestic savings and thus a fixed domestic capital supply, where only the residence-based tax is used in the optimum. The other limiting case leading to the same result arises when the taxing country faces a perfectly elastic capital demand.

Later work has shown that there is a more general theoretical basis for the superiority of residence-based capital taxation, which is closely linked to the fundamental *production efficiency theorem* in optimal tax theory (Diamond and Mirrlees, 1971). In a closed economy setting, this theorem postulates that if a full set of tax instruments exists and there are no untaxed profits, then production decisions should not be distorted in a tax optimum. Applied to an open economy context, this requires that marginal productivities of capital are equalized across countries. It can be seen from (9.7) that this condition is always fulfilled under the residence principle, even if tax rates differ across countries. In contrast, (9.9) shows that the same is true under the origin principle if and only if tax rates are equal in the trading countries[2]. Homburg (1999) has labeled this result the *international* production efficiency theorem, in order to differentiate it from the optimal taxation of capital income from the perspective of a single country.

Keen and Wildasin (2000) have raised an important caveat, however, by showing that international production efficiency cannot generally be equated with (international) Pareto efficiency, even if the conditions of the Diamond and Mirrlees theorem in the closed economy are met. The additional difficulty that arises in an international context is that countries face distinct national budget constraints. Hence, if the shadow price of public revenues differs between countries, and lump-sum transfers or equivalent policy tools are absent, then it will be

[2] See Frenkel, Razin and Sadka (1991, ch.5) for a detailed analysis in the small country case and Homburg (1999, proposition 2) for an exposition in the case of large countries. Keen and Piekkola (1997) consider the optimal taxation of international capital income in a more general framework where untaxed profits are permitted and link their results to the optimal tax rules derived by Horst (1980). They show in a two-country general equilibrium model that if profits are incompletely taxed, then the globally optimal mix of residence – and source-based capital taxation depends – as in Horst's analysis – on the elasticities of the demand for capital and the supply of savings. If profits can be fully taxed, however, the Horst rule loses its relevance and source taxes are zero, in accordance with the production efficiency theorem.

globally welfare improving to sacrifice production efficiency in order to redistribute tax revenues to the country with the greater need for government funds.

Problems of enforcing the residence principle

Despite the caveat just mentioned, it is widely accepted that international production efficiency is desirable and hence the taxation of capital income should follow the residence rather than the source principle. This contrasts, however, with recent tax reforms in several countries towards a source-based system of capital taxation. In this subsection we therefore critically discuss the feasibility of residence-based capital taxation.

International tax relations are governed by a comprehensive net of bilateral double taxation treaties, based on the recommendations of the OECD model double taxation convention (OECD, 1977). This model convention generally grants the host country of an investment the right to tax incomes that originate within its territory, but leaves the home country of the investor two different options to avoid international double taxation: it can either exempt the foreign-earned income from domestic tax, or it can grant a tax credit for the taxes paid in the source country.

When the residence country exempts foreign-earned income from tax, then a pure source principle applies for international factor flows. With a tax credit matters are more complicated since residence countries generally do not offer a tax refund if the tax payment in the source country exceeds the tax liability on the same income in the country of residence. Therefore, two cases must be distinguished: if the tax rate of the source country is higher, then a pure source principle also applies under the tax credit method. In contrast, if the tax rate in the residence country is the higher one, then tax revenues are shared between the two countries but the tax rate of the residence country is relevant from the perspective of the international investor.

The fact that the residence principle must generally be implemented by means of a (limited) tax credit already points to a fundamental theoretical problem faced by residence-based capital taxation. In a non-cooperative game between host and residence countries the host country always has an incentive to set its tax rate at least as high as the tax rate in the residence country. The reason is that this will allow the host country to appropriate the maximum amount of tax revenue without adversely affecting investment decisions in its territory. A situation of equal tax rates can, however, clearly not be optimal for the residence country, whose tax revenues will then be zero. Hence, depending on the exact specification of the model, there exists either no Nash equilibrium at all (Gordon, 1992), a Nash equilibrium that eliminates all trade in capital (Bond and Samuelson, 1989), or the residence country endogenously chooses a zero tax

rate on capital and thus eliminates the tax credit (Janeba, 1995; Wagener, 1996)[3].

Despite the problem that tax credits may give rise to strategic behavior by source countries, tax credits are widely used in existing double taxation arrangements[4]. However, existing tax credits lose much of their importance when institutional arrangements are considered in more detail. This will be shown below for the case of corporate taxation on the one hand, and interest income taxation on the other.

Turning first to corporation tax, the principal problem of enforcing residence-based corporate income taxes is the possibility of deferring taxation in the residence country through the retention of profits. This strategy will be attractive whenever tax rates in the residence country are higher than in the souce country. In the opposite case, however, residence-based taxation is also precluded because the limitation of the tax credit to the tax rate of the residence country will then be binding.

It then follows that residence-based corporate taxation can be ensured only if (i) unlimited tax credits are granted in the residence county, thus allowing for tax rebates; (ii) corporate profits of a foreign subsidiary are taxed in the residence country of the parent upon accrual, even if these profits are not distributed and repatriated. Condition (i) would further increase the above-mentioned incentive for host countries to push source taxes on foreign corporations upward and 'exploit' the tax crediting arrangement. Most likely, such a scenario would be feasible only in the presence of a clearing mechanism that allocated tax revenue between source and residence countries. Condition (ii) is not compatible with current international law, which regards the foreign subsidiary as an independent legal entity. It implicitly assumes a pure 'conduit system' under which corporation tax is a withholding tax only for personal income tax. It should be obvious even from this brief discussion that the *de facto* taxation of corporate profits in the residence country of the investor is impossible without a fundamental reform of the entire present system of corporate taxation.

In the case of interest income taxation, all countries legally adhere to the residence principle with tax credits for foreign source taxes. However, institutional investors such as pension funds, life insurance companies and social security funds are often tax-exempt in the residence

[3] A related and well-known result is that a small capital exporting country that unilaterally decides on the method of double taxation relief should allow taxes paid in the source country to be deducted from the domestic tax base, but will not find it optimal to grant a full tax credit. From the perspective of the capital exporting country, this *deduction method* (P. Musgrave, 1969; R. and P. Musgrave, 1989, pp.571-2) equates the social return to a unit of capital invested at home and abroad, but grants only partial double taxation relief to the investor.

[4] One explanation for this 'tax credit puzzle' has been advanced by Gordon (1992). He shows that a capital exporter, acting as a Stackelberg leader, may offer a tax credit to induce the capital importing country to set a positive source tax on capital rather than behave as a tax haven. This in turn allows the capital exporting country to raise its tax on domestic capital income, with less fear of inducing capital flight. Janeba (1995) offers an alternative explanation that is based on cooperative tax setting. He shows that the tax credit is the only method of double taxation relief which allows policy-makers to implement all efficient outcomes without restraining countries in the choice of capital tax rates.

country so that the source principle is effectively in place for these incomes. For the remaining part of private savings, which is taxable under national law, the core problem is the enforcement of taxes on income earned abroad. Widespread evasion of residence-based capital taxes was the primary reason for the reforms towards a dual income tax in Scandinavia and Austria. Even a country such as Germany, which still nominally maintains a comprehensive, residence-based personal income tax, has been forced by a Supreme Court ruling to raise the allowance for personal interest income by a factor of ten, thus exempting roughly 80 percent of private interest income from tax (Genser, 1996a, pp.76-7). The decision of the Supreme Court was motivated explicitly by the inequities caused by widespread evation of capital income taxes, which were estimated to substantially exceed 50 percent of total taxable interest income.

The existing econometric evidence also points very strongly in the direction of large-scale evasion of interest income. This work has estimated the effect that the introduction of a withholding tax on interest income has on the pre-tax rate of return required by investors. The underlying idea is that withholding taxes should have no effect on the gross-of –tax interest rate, if investors use the tax credit offered by their country of residence, and hence subject their interest income to the legally stipulated residence principle of taxation. With respect to the (temporary) introduction of a withholding tax on interest income in Germany in 1989, Nöhrbaß and Raab (1990) have found, however, that the gross interest rate has risen by the full amount of the tax, indicating that tax credits are irrelevant from the perspective of international investors. A study by Eijffinger, Huizinga and Lemmen (1998) confirms this result for a broader sample of countries that impose interest withholding taxes on either US or Japanese investors. Here again, the estimates from the pooled cross-section, time-series regressions indicate that pre-tax returns must rise by the full amount of the tax, implying that none of the tax is borne by international investors. Together these results strongly suggest that withholding taxes are largely seen as final taxes by internationally mobile investors, implying that the legally applicable residence principle plays only a very limited role for the international taxation of capital income.

For these reasons, most of our analysis below will assume that capital taxes are levied under the source principle.

9.6 A Basic Model of Asymmetric Capital Tax Competition

The fundamental contributions on tax competition between countries of different size are Bucovetsky (1991) and Wilson (1991). This section develops an intuitive understanding for the basic results derived in their analyses[5].

The analysis considers a static model of two countries $i \in \{A, B\}$ which are identical in all respects except for population size. In the basic model of this section, each individual in either jurisdiction exogenously supplies one unit of labor and k^* units of capital. Thus k^* is also the average capital-labor ratio in the world. Capital is perfectly mobile between countries whereas labor is immobile. In the presence of international capital flows, the capital-labor ratio employed in each country differs from the world average. In this chaper, we denote the *per capita* level of capital k^i, and s^i is the exogenous share of country *i* in the world population. The worldwide capital market clearing condition is then given by[6]

$$s^A k^A + s^B k^B = k^*, \qquad s^A + s^B = 1 \tag{9.10}$$

Both countries produce a single, homogeneous output good whose price is normalized to unity. The production function is identical across countries and exhibits constant returns to scale; hence it can be written as $f(k^i)$. It is twice differentiable, with the usual properties $f'(k^i) > 0$, $f''(k^i) < 0$. Output and factor markets are perfectly competitive.

Each country levies a source tax at rate t^i on each unit of capital employed in its jurisdiction. Since *per capita* endowments, technologies and preferences are identical, capital movements will occur in equilibrium only if tax rates differ between countries. We assume, without loss of generality, that $t^A \geq t^B$. Then, if capital flows occur in equilibrium, the high-tax region *A* exports capital to country *B*.

Producer profit maximization implies that the gross return to capital equals its marginal product. Arbitrage by investors equates the net-of-tax returns, $f'(k^i) - t^i$, across countries

$$f'(k^A) - t^A = f'(k^B) - t^B \equiv R. \tag{9.11}$$

Solving (9.10) for k^A and k^B, respectively, substituting in (9.11) and implicitly differentiating gives the change in each country's *per capita* capital stock in response to a domestic tax increase.

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[5] Section 9.6-9.7 are a revised an simplified version of Eggert and Haufler (1998).

[6] To derive this *per capita* formulation, let $K^* = K^A + K^B$ denote the more conventional full employment condition in levels. Dividing through by the world labor endowment, L^*, and using the definitions $s^i = L^i / L^*$ for the shares of each country's population size gives (9.10).

$$\frac{\partial k^i}{\partial t^i} = \frac{(1-s^i)}{(1-s^i)f''(k^i) + s^i f''(k^j)} < 0 \quad \forall \quad i, i \neq j. \tag{9.12}$$

It can be seen (9.12) that the numerator is larger for the small country, and this effect must dominate any difference in the denominator[7]. Hence the small country faces the larger reduction in its *per capita* capital stock following a domestic tax increase. This is the crucial effect for the asymmetric incentives that exist in a model where countries of different size engage in capital tax competition.

Each government maximizes the (identical) utility function of a representative individual in its jurisdiction, $u(c^i, g^i)$, where c^i and g^i denote private and public consumption *per capita*. Thus the public good considered here is a quasi-private good and there are no economies of scale in its consumption (cf. Wilson, 1991, p.426). The private and public good represent different uses of the same output, so that the marginal rate of transformation between c^i and g^i is equal to one. In the benchmark model the only tax instrument available to the government is a source tax on the capital employed in its jurisdiction. The government budget constraint of each country is then simply

$$g^i = t^i k^i \quad \forall \quad i. \tag{9.13}$$

In each of the two countries, the *per capita* private budget constraint of a representative individual is given by

$$c^i = f(k^i) - f'(k^i)k^i + Rk^*. \tag{9.14}$$

Each government takes the tax rate in the other region as given and the first-order conditions for the optimal source tax on capital are determined by

$$\frac{\partial u}{\partial t^i} = \frac{\partial c^i}{\partial t^i} + m^i(c^i, g^i)\frac{\partial g^i}{\partial t^i} = 0 \quad \forall \quad i, \ . \tag{9.15}$$

where the marginal rate of substitution $m^i(c^i, g^i) = (\partial u / \partial g^i)/(\partial u / \partial c^i)$ is non-decreasing in c^i and non-increasing in g^i. Differentiating (9.13) - (9/14) with respect to t^i and substituting in (9.15) gives the best-response function (cf. Bucovetsky, 1991, 8)

[7] This is most easily seen for the case of quadratic production functions, where $f'' = \text{const}$ and the denominator is the same for both countries.

$$f''(k^i)\frac{\partial k^i}{\partial t^i}(k^* - k^i) - k^* + m^i\left(k^i + t^i\frac{\partial k^i}{\partial t^i}\right) = 0 \quad \forall \quad i, \tag{9.16}$$

Where the partial derivatives $\partial k^i / \partial t^i$ must be inserted from (9.12).

The first of the three terms in (9.16) is positive for a capital exporting country, but negative for a capital importer. The second term is always negative and identical for both countries, while the third term must be positive in each country under an optimal tax policy. Assume now that even though the derivative $\partial k^i / \partial t^i$ differs for the small and the large country, both set the same tax rate and have the same capita-labor ratio in equilibrium. In this case the first terms in (9.16) drop out for both countries, but the third term will be unambiguously smaller in the small country. Hence this cannot be an equilibrium, given that the second terms are identical in both countries. The only possible adjustment is for the small country to reduce its tax rate. This will raise the capital-labor ratio in this country from the arbitrage condition (9.11) and increases the third term. This is, of course, fully compatible with a standard inverse-elasticity reasoning, since we have seen in our discussion of (9.12) that the small country faces the more elastic tax base.

Given that *per capita* endowments in both countries are equal, it is then only a small step to establish that *per capita* utility in the Nash equilibrium must be higher in the small country as compared to the large region. Since the low-tax country always has the higher capital-labor ratio in this model, the small country must also have the higher wage rate in equilibrium. At the same time, the return to the capital endowment is equalized across countries by investor arbitrage. Hence the total value of the *per capita* endowment in the small country exceeds *per capita* income in the large region.

The results which have been intuitively derived here have been proven more formally in the analyses of Bucovetsky (1991) and Wilson (1991). While Bucovetsky was able to demonstrate these results only for the case of quadratic production functions (theorems 1 and 2), Wilson has shown that the proof carries over to more general production functions (propositions 1 and 2). For later reference, we summarize these results in

Proposition 5.1 (Bucovetsky, Wilson)

If two countries differ only in size, then the smaller country levies the lower capital tax rate and has the higher per capita utility level in the asymmetric Nash equilibrium.

Proposition 5.1 compares the *per capita* utility levels in the two competing countries in the

Nash equilibrium. It does not, however, compare the utility level of the small country in the Nash equilibrium to this country's utility level under tax coordination. Nevertheless, this comparison can also be easily deduced from the simple analysis carried out above.

To evaluate under which conditions a small country can gain from capital tax competition, let us first consider the reference case of full coordination. Importantly, there is no motive for trade in a model with identical *per capita* endowments so that a coordinated policy can at best replicate the closed economy equilibrium. In the absence of capital mobility we have $\partial k^i / \partial t^i = 0$ and $k^A = k^B = k^*$. It is then seen immediately that both first-order conditions (9.16) reduce to $m^i = 1$, which is the condition for an efficient provision of the public good. If we open the economies to trade, global efficiency requires that optimal tax rates are the same in both countries, equalizing the marginal product of capital across countries from (9.11). Identical technologies then imply $k^A = k^B = k^*$ and there are no capital movements between countries of different size in the coordinated open economy equilibrium. Furthermore no country needs to fear a capital outflow from a *coordinated* tax increase and $m^i = 1$ will again be attained. From a global perspective the capital tax is a lump-sum instrument, allowing each country to redistribute purchasing power from the private to the public sector at no extra cost.

Against this coordination scenario, we can now discuss two special cases of tax competition. The first is the case where both countries are of equal size. In the second case the small country's share in the world population approaches zero.

1) The first scenario is the symmetric case, $s^A = s^B = 0.5$, which implies that the first-order conditions (9.16) are identical for the two countries and a Nash equilibrium with equal tax rates exists. Hence there will again be no capital movements in equilibrium. However the partial derivatives $\partial k^i / \partial t^i$ in (9.12) are negative in the case of symmetric tax competition, since each country perceives a capital outflow in response to a domestic tax increase, conjecturing a *constant* tax rate in the other region. Substituting (9.12) and $k^A = k^B = k^*$ into the best-response function (9.16) gives

$$m^i = 1 \Big/ \left(1 + \frac{t^i}{2 f''(k^*)} \right) > 1 \quad \forall \quad i, \tag{9.17}$$

in the symmetric Nash equilibrium. Since no country can influence the international distribution of income to its own advantage, the only effect of opening the economies to trade is a reduction in the level of public good provision below its efficient level. Hence welfare in both countries must be unambiguously lower than in the coordinated case.

2) The other special case arises when the share of the (by convention) large country *A* in the overall population approaches one. From (9.12) the derivative $\partial k^A / \partial t^A$ then approaches zero and country *A* will choose the same tax rate as in the coordinated case (or

in the closed economy). For the small country *B* this implies that the utility level under coordination can always be attained by also setting its tax rate equal to the closed economy level. However (9.16) shows that this cannot be optimal since the derivative $\partial k^B / \partial t^B$ is non-zero for this country. By a revealed preference argument the welfare level of an *infinitesimally small* country must therefore necessarily be higher than under coordination.

It follow from these two cases that there must be a critical level of s^B, where the smaller country is just indifferent between coordination and the non-cooperative Nash equilibrium. At this critical level of relative country sizes, the net benefits from non-cooperation turn positive for the smaller country. In contrast, it is clear that the larger country must always lose from asymmetric tax competition, because it underprovides the public good and at the same time loses tax revenue to its small trading partner.

The result that a *sufficiently* small country can gain from tax competition is also discussed in the analyses of Bucovetsky (1991) and Wilson (1991). Since this finding is critical for our further discussion in this chapter, we summarise it in

Proposition 5.2 (Bucovetsky, Wilson)

If differences in country size between two otherwise identical jurisdictions are continuously increased, there must be a critical distribution of the world population where the smaller country has a higher per capita *utility level in the non-cooperative Nash equilibrium, as compared to the equilibrium with coordinated tax rates.*

In our numerical analysis below, we will examine how realistic the possibility raised by proposition 5.2 is for a set of 'plausible' parameter values. Before this is done, however, it is important to be aware of the limitations of the theoretical model used so far. For this reason, the following section analyses an important model extension – the availability of an additional wage tax instrument – and asks whether this is likely to affect the possibility of the small country to gain from tax competition.

9.7 Asymmetric Capital Tax Competition with Two Tax Instruments

The case where governments of different size simultaneously dispose of a source-based labor tax and a distortionary tax on wage income is analyzed by Wilson (1991, section 6). However, Wilson's treatment uses a fixed revenue constraint so that effectively only one of the two tax instruments can be endogenously chosen. This implies, however, that there can be no

undersupply of public goods and hence no potential losses from tax competition for the small country. Since our purpose here is only to prepare the simulation analysis in the following section and derive first-order conditions for the optimal capital tax rates that are comparable to (9.16), we can extend Wilson's framework and allow for an endogenous supply of the public good. At the same time, our treatment in this section extends the analysis of optimal factor taxation in a small open economy, as the world price of capital will generally be affected by tax policies in the two countries.

To prevent the wage tax from being a lump-sum instrument, the standard model of asymmetric capital tax competition is modified to allow for an endogenous labor supply. The *per capita* production function of country i is then given by $f(k^i, l^i)$, where l^i is the endogenous labor supply of each individual. The gross wage and the gross return to capital in each country are given by w^i and r^i, respectively. Producer profit maximization implies $\partial f / \partial t^i = w^i$ and $\partial f / \partial k^i = r^i$. Assuming that the production function exhibits constant returns to scale, the zero profit condition can be written as

$$f[k(w^i, r^i), l(w^i, r^i)] - r^i k(w^i, r^i) - w^i l(w^i, r^i) = 0,$$

Where we note again that all functional relationships are identical across countries. Implicitly differentiating and using the conditions for producer profit maximization links the capital-labor ratio to the slope of the factor price frontier $w^i(r^i)$

$$\frac{\partial w^i}{\partial r^i} = -\frac{k^i}{l^i}. \tag{9.18}$$

In addition to the capital tax rate t^i the government disposes of a labor tax instrument, denoted by t_w^i. If both taxes are unite taxes, the net returns to each factor are defined by

$$\omega^i = w^i - t_w^i \quad \forall \quad i, \tag{9.19}$$

$$R = r^i - t^i \quad \forall \quad i, \tag{9.20}$$

where ω^i is the net wage in country *i* and *R* is the endogenous world (net) return to capital, which must be equal in the two countries. Of course, the government budget constraint (9.13) also changes to

$$g^i = t^i k^i + t_w^i l^i. \tag{9.21}$$

For simplicity, we assume that the representative individual in each country maximizes an additively separable utility function $u = u_1(c^i l^i) + u_2(g^i)$. The budget constraint of a typical individual in each country is given by

$$c^i = \omega^i l^i + Rk^* \quad \forall \quad i. \tag{9. 22}$$

Solving the household's maximization problem determines the *per capita* labor supply function $l(\omega^i, R)$. Note that, owing to the separability of the direct utility function, labor supply is independent of g^i. However, the level of the public good enters the indirect utility function $v(\omega^i, R, g^i)$. The government's problem is then to maximize *v* subject to its budget constraint (9.23). Using (9.18) – (9.20) and introducing the arguments of $v(.)$ and $l(.)$ to facilitate the derivations below, gives the Lagrangians

Factor taxation

$$\begin{aligned}\mathcal{L}^i &= v(w[R+t^i] - t_w^i, R, g^i \\ &+ \lambda\left\{\left(t_w^i - t^i \frac{\partial w}{\partial r^i}[R+t^i]\right) l^i(w[R+t^i] - t_w^i, R) - g^i\right\}.\end{aligned} \tag{9. 23}$$

Note that $R(t^i)$ is a function of each country's capital tax rate in this model. Expressing the capital stock in each country as a function of the domestic return to capital, we can re-write the capital market clearing condition (9.10) as

$$s^i k(R+t^i) + s^j k(R+t^j) - k^* = 0,$$

where $k(.)$ denotes a functional argument. Implicitly differentiating the capital market clearing condition gives in a first step

$$\frac{\partial R}{\partial t^i} = \frac{-s^i(\partial k / \partial r^i)}{s^i(\partial k / \partial r^i) + (1-s^i)(\partial k / \partial r^j)} \quad \forall \quad i, j, \quad i \neq j.$$

This expression can be further reduced if we implicitly differentiate the profit maximization condition $\partial f / \partial k^i(k^i) = r^i$ to get $\partial k / \partial r^i = 1/(\partial^2 f / \partial k^{i2}) < 0$. Substituting this and performing straightforward manipulations gives the final equation for the tax-induced change in the world return to capital

$$\frac{\partial R}{\partial t^i} = \frac{-s^i(\partial^2 f/\partial k^{j2})}{s^i(\partial^2 f/\partial k^{j2}) + (1-s^i)(\partial^2 f/\partial k^{i2})} < 0 \quad \forall \;\; i, j, \;\; i \neq j \,. \tag{9. 24}$$

Hence, a source tax on capital imposed by either country reduces the overall demand for capital and lowers the world interest rate. Furthermore, it is seen from the numerator in (9.24) that this effect will be the stronger, the larger is the country that imposes the tax. Focusing on the differential effects that domestic capital taxes have on the world interest rate – rather than deriving the change in the domestic *per capita* capital stock, as in (9.12) – is thus simply an alternative way of showing the asymmetric strategic incentives that exist for the small and the large country.

Capital's gross-of-tax return, $r^i = R + t^i$, is determined by

$$\frac{\partial r^i}{\partial t^i} = \frac{\partial R}{\partial t^i} + 1 = \frac{(1-s^i)(\partial^2 f/\partial k^{i2})}{s^i(\partial^2 f/\partial k^{j2}) + (1-s^i)(\partial^2 f/\partial k^{i2})} > 0 \quad \forall \;\; i, j, \;\; i \neq j \,. \tag{9. 25}$$

which shows that the capital tax is only partly shifted into lower world prices and will also raise the gross return to capital in the taxing country.

We can now differentiate the Lagrange function (9.23) with respect to the two tax instruments and the level of public good supply, employing $\partial v/\partial w^i = (\partial v/\partial c^i)l^i$ from Roy's identity and $\partial v/\partial R = (\partial v/\partial c^i)k^*$ from (9.22). Further using (9.18) and (9.25) in the first-order condition for the capital tax rate gives

$$\frac{\partial L}{\partial t_w^i} = -l^i \frac{\partial v}{\partial c^i} + \lambda^i \left\{ l^i - \left[t_w^i - t^i \frac{\partial w}{\partial r^i} \right] \frac{\partial l}{\partial w^i} \right\} = 0 \,, \tag{9. 26}$$

$$\begin{aligned} \frac{\partial L}{\partial t^i} &= \left[-k^i + (k^* - k^i)\frac{\partial R}{\partial t^i} \right] \frac{\partial v^i}{\partial c^i} \\ &+ \lambda^i \left\{ k^i - t^i \frac{\partial^2 w}{\partial r^{i2}} l^i \left(\frac{\partial R}{\partial t^i} + 1 \right) + \left[t_w^i - t^i \frac{\partial w}{\partial r^i} \right] \left[\frac{\partial w}{\partial r^i} \frac{\partial l}{\partial w^i} \left(\frac{\partial R}{\partial t^i} + 1 \right) + \frac{\partial l}{\partial R} \frac{\partial R}{\partial t^i} \right] \right\} = 0 \end{aligned} \tag{9. 27}$$

$$\frac{\partial L}{\partial g^i} = \frac{\partial v}{\partial g^i} - \lambda^i = 0 \,. \tag{9. 28}$$

Since the wage tax is set optimally we can multiply (9.26) by $(-k^i/l^i)$ and add the resulting equation to (9.27). Furthermore, assuming complementarity between capital and labor in the production function, we can differentiate (9.18) with respect to r^i to get

$$\frac{\partial^2 w}{\partial r^{i2}} = -\frac{\partial(k^i / l^i)}{\partial r^i} > 0, \tag{9. 29}$$

Further using (9.28) to eliminate the Lagrange multiplier λ^i, dividing by $(\partial v / \partial c^i)$ and introducing the marginal rate of substitution, m^i, gives

$$(k^* - k^i)\frac{\partial R}{\partial t^i} + m^i\left\{t^i l^i \frac{\partial(k^i / l^i)}{\partial r^i}\left(\frac{\partial R}{\partial t^i} + 1\right) + \left(t_w^i + t^i \frac{k^i}{l^i}\right)\left(\frac{\partial l^i}{\partial R} - \frac{k^i}{l^i}\frac{\partial l^i}{\partial w^i}\right)\frac{\partial R}{\partial t^i}\right\} = 0 \tag{9. 30}$$

Equation (9.30) is the first-order condition for the capital tax in the presence of a simultaneous wage tax instrument and thus corresponds to the optimality conditions (9.16) in section 9.6. The important difference is that the optimal use of the labor tax instrument is incorporated in (9.30). The condition therefore isolates those effects of the capital tax instrument that cannot be duplicated by a direct tax on wages.

The first term in (9.30) is a terms of trade effect that derives from the fall in the world price of capital in response to a domestic tax. This term is positive for the capital importer, but negative for the capital exporter. The second effect – the first effect in the curly bracket – gives the change in the capital-labor ratio induced by the tax and captures the distortion in the international allocation of capital. Using (9.25) and (9.29) shows that this effect is negative for a positive tax rate on capital. Finally, the third effect in (9.30) gives the increase in labor supply that is feasible for any given level of g^i when some of the tax burden falls on capital. This effect must be positive when the labor supply curve is upward sloping $(\partial l^i / \partial w^i > 0)$ and leisure is a normal good so that income effects from changes in the return to the capital endowment reduce labor supply $(\partial l^i / \partial R < 0)$.

If country *B* is infinitesimally small $(s^B = 0)$, it follows from (9.24) that $\partial R / \partial t^B = 0$. In this case, only the second effect in (9.30) remains and only $t^i = 0$ satisfies the optimality condition. In this case, the capital tax falls entirely on labor and is thus dominated by a direct tax on wages. Hence, the optimality of a zero source tax on capital in a (infinitesimally) small open economy is included in the present analysis as a special case.

Correspondingly, the first-order condition for the optimal capital tax rate will also simplify for a very large country $(s^A \to 1)$. Note first from (9.24) and (9.25) that $\partial R / \partial t^A = -1$ and $\partial r^A / \partial t^A = 0$ in this case. Substituting this in (9.27), using (9.28) and introducing m^i gives

$$\frac{\partial L}{\partial t^A} = -k^* + m^A\left\{k^A - \left[t_w^A + t^A\frac{k^A}{l^A}\right]\frac{\partial l^A}{\partial R}\right\}$$
$$= k^A(m^A - 1) - m^A\left[t_w^A + t^A\frac{k^A}{l^A}\right]\frac{\partial l^A}{\partial R} = 0. \qquad (9.31)$$

The second line in this equation has used the fact that $k^* = k^A$ must hold for a very large country which, in the limiting case, becomes a closed economy. It can be seen from (9.31) that the shadow price of public consumption will then be less than one (i.e. the forst term in the second line must be negative), because the income losses caused by the reduction in the net return to capital will have a positive effect on work effort and thus tax revenues (so that the second term in the second line is positive)[8]. Clearly, since the capital tax represents a lump-sum instrument in the closed economy, it will dominate the distortive labor tax from the perspective of a very large country.

It follows from this discussion that an infinitesimally small country must gain even more from tax competition in the presence of an additional wage tax instrument than it does in the standard model discussed in section 9.1. Since the large country does not use the wage tax instrument, it will choose the same capital tax rate as before. The small country, however, chooses a capital tax rate of zero if it can also tax labor income. By a similar revealed preference argument as above, the zero tax on capital therefore not only dominates the cooperative solution from the perspective of the (very) small country, but it also dominates the positive tax rate that the small country has set in the benchmark with only one tax instrument.

More generally, however, both countries face finite elasticities for the capital and labor tax bases and will choose some combination of the two distortive instruments. The third term in (9.30) is then positive under the assumptions on income effects made above, reflecting the fact that the base of the capital tax is less than perfectly elastic. Hence, the capital importer (for whom the first term is also positive) will unambiguously set a positive tax rate on capital. For the capital exporter, the terms of trade effect is negative, however, so that no unambiguous result emerges for t^i on the basis of our (9.30). For the case of a fixed government budget, Wilson (1991) is able to demonstrate that both tax rates must be positive in both countries in the optimum. Hence, the reduced reliance on capital taxation in the large country will lower the redistributive gains to its small, low-tax neighbor.

However, when public good supply is endogenous, the existence of the second tax instrument may also allow the small country to reduce the excess burden of taxation and increase public

[8] It is well known that the marginal costs of public funds can be less than one when tax revenues are not redistributed lump-sum to the representative consumer, and the tax base increases as a result of the income effect caused by the tax. See Ballard and Fullerton (1992) for a detailed discussion.

good supply towards its efficient level. Hence, it cannot be concluded in general that adding a wage tax instrument to the model of asymmetric capital tax competition will always reduce the possibilities of the smaller country to gain from tax competition. In the following section, we will therefore set up a numerical specification of the model that allows us to weigh the gains from the inflow of foreign capital to the smaller country against the inefficiencies caused in the domestic supply of public goods.

9.8 Transfer Pricing

Multinational enterprises (*MNEs*) are private organizations that engage in foreign direct investment (*FDI*) in the form of owning and/or controlling value-adding activities in more than one country. The parent firm and its domestic and foreign affiliates engage in international production, producing and selling products around the world. *MNEs* can be either horizontally integrated (different affiliates produce, the same product in different markets) or vertically integrated (upstream affiliates produce intermediate products that are further processed by downstream affiliates prior to final sale) or both.

Because the *MNE* is an integrated enterprise, its affiliates engage in substantial amounts of intrafirm transactions. The price of any non-arm's length transaction involving transfers of goods, intangibles or services between wholly or partly owned affiliates (parent, branch, subsidiary) of a multinational enterprise is called a *transfer price*.

MNEs create particular problems for tax authorities that do not occur in taxing domestic firms. The key reason is that the *MNE* is an *integrated or unitary business*. The accepted definition of an *MNE* is two or more firms, located in different countries, but under *common control*, with a *common pool of resources* and *common goals*.

The *MNE* has certain characteristics which pose problems for tax authorities:

(1) A multinational has affiliates located in several countries.

The *MNE* has a global reach, whereas governments are limited by their geographic boundaries to a national reach. This creates jurisdictional problems for domestic tax authorities and limits the effectiveness of governments in taxing *MNEs*.

(2) All components of a multinational are under the common control of the parent firm.

The *MNE* decisions on investment, production, sales, trade, and pricing may be made outside the country

(3) *All members of the MNE family have common goals such as the maximization of global after-tax profits.*

This brings the affiliates of the enterprise into conflict with the governments where they are

located since each government has its own national goals which most likely differ from the *MNE*'s goals.

(4) A multinational has common overheads and resources.

This causes problems for tax authorities in deciding where the tax base is located and how to allocate the income from, and expenses of, *MNE* activities among jurisdictions. The resources allow the *MNE* to escape the jurisdiction of national governments.

Conflicts are inevitable when national governments tax multinationals because domestic tax systems set up for domestic purposes, by definition, are poorly designed to handle the international activities of multinational enterprises. Thus tax authority and *MNE*s are likely to disagree about the appropriate tax the enterprise should pay at the national level. Conflict can also occur between the tax authorities of the countries where the units of the *MNE* are located as these governments compete for their fair share of an increasingly mobile tax base. Double taxation and/or undertaxation of *MNE* profits, relative to the taxes that would be paid by a purely domestic firm engaged in comparable activities in comparable circumstances, is highly probable.

What Is a Transfer Price?

MNEs supply their affiliates with a package of capital and technology inputs and managerial skills, for which the parent firm receives a stream of dividend and interest payments, royalties, and license fees. Intrafirm transfers of technology, management services, and financial loans move around within the *MNE* family. Intermediate goods flow downstream for further processing before final sale to end consumers. Some affiliates provide business services on behalf of the group.

All these transfers are called *intrafirm trade*. The price of any non-arm's length transaction involving goods, technology, or services between wholly or partly owned affiliates of the *MNE* is called a *transfer price*.

Most intrafirm flows of tangibles (raw, and semi-finished products, finished goods) are valued by the *MNE* in one of two ways: on a *cost plus* basis, that includes direct costs plus some allocation for overhead expenses of the producer, or on a *market price* basis, where prices charged to nonrelated firms are used to determine transfer prices on related party sales.

The Multinational's Motivations for Transfer Pricing

There are both internal and external motivations for transfer pricing. In terms of internal

motivations, where different affiliates within the *MNE* family are treated as stand-alone units called *profit centres*, transfer prices are needed internally by the *MNE* to determine profitability of the individual divisions. Transfer prices can also be used for internal measures of performance by individual affiliates and to motivate corporate managers.

Other units within the *MNE* are likely to be run as *cost centres*. In such cases, downstream affiliates are generally charged a share of the costs of providing the group service function so that the service provider covers its costs plus a small mark-up.

On the other hand, affiliates often share in the ongoing goodwill intangibles of the parent, exchange information among themselves, and offer short-term assistance when problems arise. These events generally occur without the need for the *MNE* to price the intrafirm activity.

Several external motivations can affect the *MNE*'s choice of transfer prices. Because multinationals operate in two or more jurisdictions, transfer prices must be assigned for intrafirm trade that crosses national borders. Border taxes such as tariffs and export taxes, are often levied on crossborder trade. Where the tax is levied on an *ad valorem* basis, the higher the transfer price, the larger the tax paid per unit. On the other hand, where border taxes are levied on a per-unit basis (i.e. specific taxes), the transfer price is irrelevant for tax purposes.

Another external factor is the need to meet the *rule of origin* that applies to crossborder flows within a free trade area. Since border taxes are eliminated within the area, rules of origin must be used to determine eligibility for duty-free status. Over-or under-invoicing inputs is one way to avoid customs duties levied on products that do not meet the rule of origin test.

The Problem of Transfer Price Manipulation (TPM)

It is important to distinguish between the terms "transfer price" and "transfer price manipulation". Transfer pricing is a normal, legitimate, and, in fact, required activity. Firms set prices on intrafirm transactions for a variety of perfectly legal and rational internal reasons, and, even where pricing is not required for internal reasons, governments require it in order to determine how much tax revenues and customs duties are owed by the *MNE*.

The image of big *MNEs* manipulating millions of dollars of crossborder flows in order to evade or avoid payment of taxes and tariffs, on the other hand, is an image of *transfer price manipulation*. Transfer price manigulation is the deliberate setting of the price paid by one company to a corporate affiliate located in another taxing jurisdiction for the purpose of reducing the aggregate "tax" burden of the company and its affiliates, where "tax" is broadly defined as any external constraints on the *MNE*, e.g. taxes, trariffs, compulsory minority shareholders, guota regulations and so on.

Governments worry about transfer price manipulation because they are concerned with the loss of revenues through tax avoidance or evasion and they dislike the loss of control. Overall *MNE* profits after taxes may be raised by either under-or over-invoicing the transfer price; such manipulation for tax purposes, however, comes at the expense of distorting other goals of the firm, in particular, evaluating management performance.

9.9 National Regulation of Transfer Pricing

The Arm's Length Standard

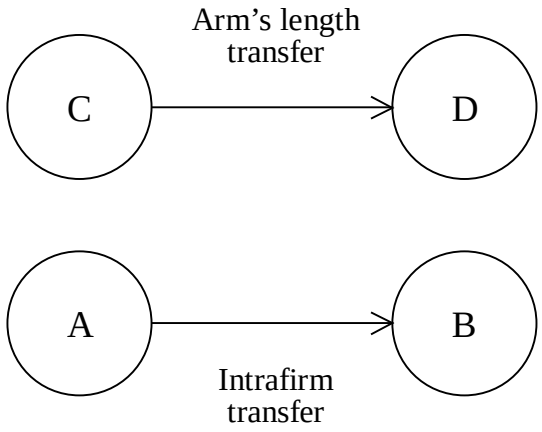
The most common solution that tax authorities have adopted to reduce the probability of the transfer price manipulation is to develop particular transfer pricing regulations as part of the corporate income tax code. These regulations are generally based on the concept of *the arm's length standard*, which says that all *MNE* intracorporate activities should be priced as if they took place between unrelated parties acting at arm's length in competitive markets. The 1979 OECD Report defines the arm's length standard as

> prices which would have been agreed upon between unrelated parties engaged in the same or similar transactions under the same or similar conditions in the open market(OECD 1979).

The arim's length standard has two methods.

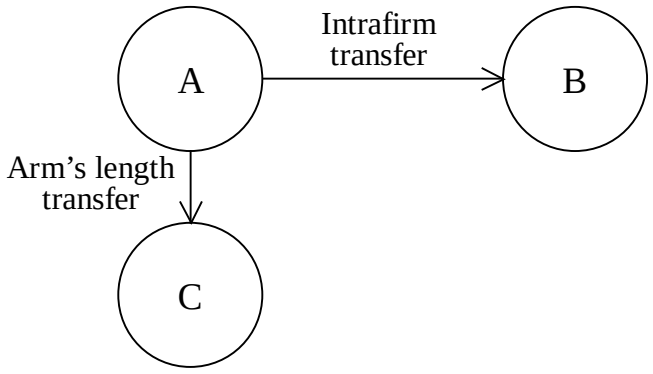
--- use the price negotiated between two unrelated parties *C* and *D* to proxy for the transfer between *A* and *B*.

Figure 9.4



--- use the price at which *A* sells to unrelated party *C* to proxy for the transfer price between *A* and *B*.

Figure 9.5



In practice, the method used will depend on the available data. Are there unrelated parties engaged in the same, or nearly the same, transactions under the same or nearly the same, circumstances? Does one of the related parties also engage in the same, or nearly the same, transactions with an unrelated party under the same, or nearly the same circumstances? Where there are differences, are they quantifiable? Do the results seem reasonable in the circumstances?

If the answers to these questions are yes, then the arm's length standard will yield a reasonable result. If the answers are no, then alternative methods must be used.

Sales of tangible property are tested against an arm's length standard based on one of five methods: comparable uncontrolled price (*CUP*), resale price (*RP*), cost plus (*C+*), profit split (*PS*), comparable profit (*CPM*). The first three are transactions-based approach, while the latter two are profit-based.

(a) The Comparable Uncontrolled Price (CUP) Method

The *CUP* method looks for a comparable product to the transaction in question, either in terms of the same product being bought or sold by the *MNE* in a comparable transaction with an unrelated party, or the same or similar product being traded between two unrelated parties under the same or similar circumstances. The product so identified is called a *product comparable*. All the facts and circumstances that could materially affect the price must be considered.

Tax authorities prefer the *CUP* method over all other pricing methods for at least two

reasons. First, it incorporates more information about the specific transaction than does any other method; i.e. it is transaction and product specific. Second, *CUP* takes both the interests of the buyer and seller into account since it looks at the price as determined by the intersection of demand and supply.

(b) The Resale Price (RP) Method

Where a product comparable is not available, so that the *CUP* method cannot be used, an alternative method is to focus on one side of the transaction, either the manufacturer or the distributor, and to estimate the transfer price using a functional approach.

Under the resale price method, the tax auditor looks for firms at similar trade levels that perform similar distribution function (i.e. a *functional comparable*). The *RP* method is best used when the distributor adds relatively little value to the product so that the value of its functions is easier to estimate. The assumption behind the *RP* method is that competition among distributors means that similar margins (returns) on sales are earned for similar functions.

The resale price method backs into the transfer price by subtracting a profit margin, derived from margins earned by comparable distributors engaged in comparable functions, from the known retail price to determine the transfer price. As a result, the *RP* method evaluates the transaction only in terms of *the buyer*. The method ensures that the buyer receives an arm's length return consistent with returns earned by similar firms engaged in similar transactions. Since the resale margin is determined in an arm's length manner, but nothing is done to ensure that the manufacturer's profit margin is consistent with margins earned by other manufacturers, the adjustment is one-sided. Under the *RP* method, having determined the buyer's arm's length margin, all excess profit on the transaction is assigned to the seller. Thus the resale price method tends to *overestimate* the transfer price since it gives all unallocated profits on the transaction to the upstream manufacturer. We call this *contract distributor* case, since the manufacturer is contracting out the distribution stage to the lowest bidder.

(c) The Cost Plus (C+) Method

The cost plus method starts with the costs of production, measured using recognized accounting principles, and then adds an appropriate mark-up over costs. The appropriate mark-up is estimated from those earned by similar manufacturers.

The assumption is that in a competitive market the percentage mark-ups over cost that could be earned by other arms length manufacturers would be roughly the same. The cost plus method works best when the producer is a simple manufacturer without

complicated activities so that its costs and returns can be move easily estimated.

In order to use the cost plus method, the tax authority or *MNE* must know the accounting approach adopted by the unrelated parties. What costs are included in the cost base before the mark-up over costs is calculated? Is it actual cost or standard cost? Are only manufacturing costs included or is the cost base the sum of manufacturing costs plus some portion of operating costs? The larger the cost base, the smaller should be the profit mark-up, or gross margin, over costs.

(d) The Profit Split (PS) Method

When there are no suitable product comparables (the *CUP* method) or functional comparables (the *RP* and *C+* methods), the most common alternative method is the profit split (*PS*) method, whereby the profits on a transaction earned by two related parties are split between the parties.

The profit split method allocates the consolidated profit from a transaction, or group of transactions, between the related parties. Where there are no comparables that can be used to estimate the transfer price, this method provides an alternative way to calculate or 'back into' the transfer price. The most commonly recommended rations to split the profits on the transaction between the related parties is return on operating assets (the ratio of operating profits to operating assets).

(e) The Comparable Profit (CPM) Method

A simple description of *CPM* is as follows: Assume *A* is the tested party and *ROA* is the profit level indicator. Industry *ROA*s very between, say, 5 and 8% with a mean of 8%. Therefore *A*'s profit should be in the 25-40 range. *A*'s profit is 20, so it is outside the range. Then use profit = sales – costs to "back into" the transfer price.

The comparable profits method (*CPM*) was widely criticized by tax practitioners, multinationals, other governments, and the OECD on the grounds that it was not compatible with the arm's length standard because (1) it was not a transactions-based method, (2) it did not take the contractual obligations of the parties into account, (3) did not reflect the facts and circumstances of the case, and (4) it could lead to substantial double taxation of income if other governments did not accept the method.

The U.S. treasury modified the method in 1993 and 1994, each time simplifying the method, and reducing its priority vis-à-vis the other methods, i.e. the *CPM* method is considered a method of last result when transactional approaches (*CUP, C+, RP*) fail.

It is not clear how *CPM* can be used in practice. The comparability requirements can be quite daunting. On the other hand, if comparability is loosely defined and

industry-wide statistics accepted, *CPM* can be calculated quite easily.

Note that the outcome is quite different from that of a profit split. The *PS* method ensures that both related parties earn the same return on assets; the *CPM*, on the other hand, ensures that one of the two parties earns the average or median of returns earned by comparable uncontrolled parties. *CPM* is somewhat like the cost plus and resale price methods in that it focuses on only one side of total profits whereas the *PS* method looks to both sides.

The International Tax Transfer Pricing Regime

The international regime has developed whereby tax authorities have attempted to establish certain principles and norms centered around the arm's length standard in order to reduce international taxation disputes.

Multilateral Solutions

The most common international solution has been the *bilateral tax treaty*. In a tax treaty, two governments spell out which one has jurisdiction over what tax base and how the tax base is to be measured and allocated. By signing tax treaties with close trading and investment partners, two countries could better regulate their cross border transactions and provide a more secure legal environment for cross border investments.

Through the League of Nations and then through the United Nations and the OECD, groups of tax experts have developed a set of principles in the form of model tax conventions to guide national taxation of multinationals and the bilateral tax treaty process.

Three principles underpin these conventions: *inter-nation equity*[9], *international neutrality*[10] and *international taxpayer equity*[11]. In the transfer pricing area, these principles are embodied in the international norm, the arm's length standard.

What Are International Regimes?

International regimes are institutions, sets of functional and behavioral relationships among national governments. These relationships embody the principles underlying the regime, the expected behavior patterns of regime member, and the formal arrangements that implement the international agreements and understandings that form the regime.

[9] tax revenues should be allocated fairly between jurisdictions

[10] taxes should not interfere with private decisions

[11] taxpayers in the same jurisdiction should be treated equally regardless of the source of their income.

Regimes are useful as a way to reduce international transactions costs in an interdependent world. When a clear legal framework establishing property rights and liability is missing, markets for information are imperfect, and/or incentives exist for actors to behave opportunistically, regimes can improve the functioning of international markets. International regimes can increase the predictability of behavior, provide generalized sets of rules, and improve the information available to participants. Thus regimes are ways to manage interdependencies among nations.

We contend that there is an international tax regime with principles, norms, rules, and procedures designed to facilitate cooperation between national tax authorities in order to better regulate crossborder taxable activities of multinationals. The goals of the regime are the avoidance of double taxation of income and the prevention of tax avoidance and evasion. These goals are to be achieved through coordination and harmonization of national tax systems. Examples of government cooperation in the tax area that form components of tax regime include a variety of national tax policies, bilateral tax treaties and model treaties and guidelines developed by institutions such as the OECD and UN. The international tax regime deals with both *jurisdictional issues* (who has the right to tax what) and *allocational issues* (how should costs and revenues be allocated and priced).

Within the international tax regime is nested another regime dealing with the taxation of intrafirm trade. The international tax transfer pricing regime focuses on the international allocation of *MNE* income and expenses, specifically on the pricing of intrafirm trade flows within the various affiliates of the multinational enterprise.

An Alternative Approach: Unitary Taxation

It is important to look at alternatives to the arm's length standard that underpins the regime. A major alternative is known as *unitary taxation.*

The arm's length standard is based on the *separate accounting* or *separate entity approach*. The borders of a firm are defined according to national boundaries, i.e. *the water's edge*. Domestic affiliates and foreign branches are consolidated with the parent firm for tax purposes, but foreign subsidiaries and other affiliates of the *MNE* are treated as separate firms.

A quite different approach is that of unitary taxation. Unitary taxation is taxation of the worldwide income of a unitary business – that is, the tax authority measures the income of all the related affiliates of a multinational enterprise that do business within the taxing jurisdictions, and then assesses tax according to the share of the worldwide business of the *MNE* that occurs within that particular jurisdiction. Unitary taxation is normally based on *formula apportionment method* whereby a firm's share of certain factors (e.g. sales, labor costs,

and capital costs) as a percentage of the worldwide *MNE* amount of these factors however weighted, is multiplied by the *MNE*'s total worldwide income to compute the tax to be paid in that jurisdiction. However, unitary taxation has been little used in practice.

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