Preferential Tax Regimes with Asymmetric Countries

Abstract - Current policy initiatives taken by the EU and the OECD aim at abolishing preferential corporate tax regimes. This note extends Keen's (2001) analysis of symmetric capital tax competition under preferential (or discriminatory) and non-discriminatory tax regimes to allow for countries of different size. Even though size asymmetries imply a redistribution of tax revenue from the larger to the smaller country, a non-discrimination policy is found to have similar effects as in the symmetric model: it lowers the average rate of capital taxation and thus makes tax competition more aggressive in both the large and the small country.

INTRODUCTION

One of the main current policy issues in corporate taxation is the proliferation of preferential tax regimes in national tax codes. These discriminatory tax measures come in one of two broad forms. A first category are preferential tax regimes that discriminate between domestically owned and foreign-owned firms, granting more favorable tax conditions to the latter. A second set of measures involves instead discrimination by industry, or by class of asset. In this case it is footloose industries, or mobile assets, that get the benefit of lower tax rates. In both cases preferential tax regimes, thus, work so as to grant tax concessions to those activities that are more mobile internationally.

In both the Organisation for Economic Co-operation and Development (OECD) and the European Union, coordinated policy initiatives are under way to reduce the number of preferential tax regimes. The OECD (1998, 2000) has issued a blacklist of predominantly small tax havens that have been induced to discontinue specific preferential tax regimes that were deemed as harmful. At the same time the European Union (EU) has identified a total of 66 “harmful tax measures,” falling in both of the above-mentioned categories, which are to be phased out by 2008 (Primarolo Report, 1999, Annex C).

From a theoretical point of view, it is unclear, however, whether the elimination of preferential tax regimes is indeed desirable from a global economic efficiency perspective. In particular, it is feared that overall tax competition might be intensified when countries are forced to abolish tax preferences for the most mobile firms or activities. This is clearly expressed in
the analysis of Keen (2001), who shows that when two symmetric countries compete for two different tax bases, both of which are internationally mobile (albeit to a different degree), the restriction to employ a single tax rate on both tax bases will unambiguously reduce tax revenues in each country. Later work has qualified Keen’s result and has shown that a ban on tax preferences need not be revenue-reducing if either the size of the two tax bases is not given for the two countries taken together (Janeba and Smart, 2003) or investors in each country exhibit a home bias (Haupt and Peters, 2005).1 Nevertheless, Keen’s result is still a forceful one.

All the above-mentioned contributions assume, however, that the two competing countries are identical in all respects.2 Given the perception that small countries are the main beneficiaries of preferential tax regimes, this is clearly an important restriction. A well-known result from the literature on asymmetric tax competition for a single tax base is that small countries will undercut their larger neighbors, and may even be better off under tax competition as compared to a situation where countries can fully coordinate their tax rates (Bucovetsky, 1991; Wilson, 1991; Kanbur and Keen, 1993).3 It is, thus, a natural question to ask whether large countries—the principal supporters of the policy initiatives referred to above—may gain from the abolition of tax preferences, by restricting the ability of small countries to compete with them on unequal terms.

In this note, we combine Keen’s (2001) analysis of discriminatory vs. non-discriminatory tax competition with the analysis of tax competition between countries of different size. We show that the smaller country unambiguously has lower tax rates, but higher per-capita tax revenue, under either restricted or unrestricted tax competition. Imposing a non-discrimination constraint hurts not only the small country, but also the large one. Hence, Keen’s (2001) result turns out to be robust with respect to the introduction of size asymmetries between countries.

THE MODEL WITH DIFFERENTIATED TAXATION

We consider two countries, \( i \in \{A, B\} \), which compete over two capital tax bases. The share of country \( i \) in their combined population is \( s_i \) and, by convention, we let country \( A \) be the smaller of the two countries (so that \( s_A \leq 0.5 \) and \( s_B \geq 0.5 \)). There are two distinct capital tax bases, \( n \in \{1, 2\} \), which differ in their degree of international mobility. The aggregate supply of each capital tax base is fixed. Each type of capital is combined with sector-specific labor that is immobile across countries. The smaller country, \( A \), has the same share of workers in each sector; hence, \( s_i \) bears no subscript. Shares sum to unity, \( s_A + s_B = 1 \). We employ the per-capita notation that is customary in the analysis of countries of different size and let \( k_n^i \) denote the per-capita employment of the capital base \( n \) in country

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1 Recently, Bucovetsky and Haufler (forthcoming) have considered a model where firms can invest in a multinational structure that allows them to benefit from tax preferences. In this setting, the welfare effects of restricting tax preferences depend critically on the elasticity with which firms change their organizational form in response to tax incentives.

2 An exception is the early analysis by Janeba and Peters (1999), which assumes that countries differ in the size of their (completely immobile) domestic tax base while competing for a second tax base that is perfectly mobile internationally. In this model there is no symmetric equilibrium in pure strategies. There exists, however, a symmetric equilibrium in mixed strategies that is analyzed by Wilson (2006). Wilson shows that whenever the domestic tax base has some degree of international mobility, the abolition of tax preferences reduces expected revenue, in line with the result in Keen (2001).

3 See Wilson (1999) for a survey. More recently, Hong and Smart (2007) and Slemrod and Wilson (2006) have evaluated the effects that the presence of small tax havens has on global welfare, with opposite conclusions being reached in the two analyses.
i. Hence, denoting the fixed supply of tax base \( n \) by \( k_n \), market clearing for both types of capital implies

\[
[1] \quad s^A_k n^A + s^B_k n^B = k_n \quad \forall n \in \{1, 2\}.
\]

To arrive at reduced–form expressions in our analysis, we assume that the production functions in both sectors, \( n \in \{1, 2\} \), are quadratic. The production functions differ across sectors but, for each sector, are the same across countries. Per–capita production in country \( i \) and in sector \( n \) is \( f^i_n = a_n k^i_n - 0.5 b_n (k^i_n)^2 \), leading to linear marginal productivity conditions for each type of capital:

\[
[2] \quad \frac{\partial f^i_n}{\partial k^i_n} = a_n - b_n k^i_n \quad \forall i \in \{A, B\}, n \in \{1, 2\}.
\]

The slope parameter \( b_n \) may differ between tax bases.

It is worth pausing a moment to link this model to the different types of preferential tax regimes mentioned in the introduction. The model considered here applies in particular to those preferential tax regimes that discriminate by industry, or by class of assets. Prominent examples are financial services, insurance and shipping, all of which are activities that are highly mobile internationally. Both the OECD (2000) and the Primarolo Report (1999) single out these sectors as industries where special tax regimes apply in many countries, large and small alike. In contrast, tax regimes that discriminate between foreign–owned and domestically owned firms are less well captured in this model.

Following a standard procedure in the literature, we assume that taxes are levied as source–based unit taxes on capital. Without loss of generality, we normalize units so that the return per unit of capital, were there no taxes, is the same for each type of capital:

\[
[3] \quad a_i - b_i k_i = a_2 - b_2 k_2.
\]

By equating the gross returns to each type of capital, this normalization ensures that equal unit taxes on each type of capital are equivalent to equal ad valorem tax rates. From [2], net–of–tax arbitrage by internationally mobile investors implies

\[
[4] \quad t^B_n - t^A_n = b_n (k^A_n - k^B_n) \quad \forall n \in \{1, 2\}.
\]

Using [1] in [4] we can derive per–capita tax bases in each country as a function of the two tax rates:

\[
[5] \quad k_n = \bar{k}_n + \frac{(1-s^j)}{b_n} (t^j_n - t^i_n) \quad \forall i, j \in \{A, B\}, i \neq j, n \in \{1, 2\}.
\]

Differentiating \( k_n \) in [5] with respect to \( t^i \) shows that the response of either capital tax base to a tax change is larger, in per–capita terms, for the smaller country, \( A \). From [5], the net return to capital of type \( n \), defined by \( r_n = f^\prime(k^A_n) - t^A_n = f^\prime(k^B_n) - t^B_n \), must be

\[
[6] \quad r_n = a_n - b_n k_n - s^A t^A_n - s^B t^B_n.
\]

Equation [6] shows how the endogenous rate of return in each sector \( r_n \) is affected by the tax policies of each country. Both countries’ taxes depress the net rate of return, but the larger country’s tax rate carries the higher weight. Moreover, in combination with the normalization [3] above, equation [6] shows that the net

\[\text{Keen (2001, p. 759) offers an interpretation by which one of the tax bases is domestic investment in a country, while the other is foreign investment. However, if the only distinction between tax bases is their owners’ residence, then we should expect the marginal product of one type of tax base to depend on the quantity of the other type, which is not the case in (2). Moreover this interpretation cannot account for the fact that each country perceives a different tax base (i.e., the investment of foreigners) to be more elastic. For these reasons, tax discrimination by the residence country of the investor is more suitably modelled in a framework with a home bias of investors, as in Haupt and Peters (2005). We thank a referee for pointing out some of these difficulties.}\]
return to capital will be equal in the two sectors whenever both countries apply a non–discriminatory tax with equal (unit or ad valorem) rates for both sectors.

As in Keen (2001), governments are assumed to maximize tax revenues. The sensitivity of the results to this assumption is discussed below. In the benchmark case, each government is allowed to levy differentiated tax rates (subscript $D$) on the different capital tax bases. Hence, each government maximizes

$$T_D = t_1^i k_1^i + t_2^i k_2^i \quad \forall i \in \{A, B\}.$$  

Substituting capital tax bases from [5] and differentiating with respect to $t_n^i$ yields Nash equilibrium tax rates in reduced form:

$$t_n^* = \frac{b_n k_n (1 + s_A)}{3 s_A s_B},$$

$$t_n^* = \frac{b_n k_n (1 + s_B)}{3 s_A s_B} \quad \forall n.$$  

In each country, the tax rate on tax base $n$, expressed as a fraction of its gross return, will be proportional to the elasticity of that return with respect to the supply of capital. The “more mobile” tax base is the one for which $b_n k_n$ is lower, implying a greater sensitivity of capital supply to its net return. Moreover, the equilibrium tax rates show that the smaller country (country $A$) levies the lower tax rate on each tax base $n$.

Finally, and importantly, it follows from [8] that the large country and the small country choose the same ratio of tax rates, $t_1^i / t_2^i$, and, hence, grant the same relative tax advantage to the more mobile type of capital. The intuition behind this result is that there are two independent determinants of the non–cooperative tax rates chosen in equilibrium, the elasticity of the tax base and the size of each country. The small country faces a higher absolute elasticity of each tax base and, therefore, chooses lower tax rates on both bases. However, the relative elasticity of the two tax bases, as given by the ratio $b_n k_n / b_x k_x$, is the same for the large country and the small country. Hence, the ratio of equilibrium tax rates will also be the same in both countries.

In equilibrium, country $i$ gets the same share of each tax base, with the smaller country getting the larger share:

$$k_n^i = \left[1 + \frac{(s_i^j - s_i^j)(1 - s_i^j)}{3 s_A^j s_B^j}\right] k_n \quad \forall i, j \in \{A, B\}, i \neq j, n \in \{1, 2\}.$$  

Substituting the optimal non–cooperative tax rates [8] along with the tax base expressions [9] in the objective function [7] gives optimized per–capita tax revenue in each country when tax rates can be differentiated:

$$T^D_A = \frac{(1 + s_A)^2}{9 (s_A^2)^2 s_B^2} (b_1 k_1^2 + b_2 k_2^2),$$

$$T^D_B = \frac{(1 + s_B)^2}{9 (s_A^2)^2 s_B^2} (b_1 k_1^2 + b_2 k_2^2).$$

Comparing the two expressions in [10] gives

$$T^D_A - T^D_B = \frac{b_1 k_1^2 + b_2 k_2^2}{9 (s_A^2)^2 (s_B^2)^2} \left[(s_B^2) - (s_A^2)^3 \right] > 0.$$  

Hence, per–capita tax revenue is higher in the smaller country. This corresponds to the well–known result that the small country achieves a higher welfare level in the Nash equilibrium than its larger neighbor (Bucovetsky, 1991; Wilson, 1991).

A core result in this section has been that the large country and the small country confer the same relative tax advantage to the more mobile tax base. This finding may seem to be at odds with the empirical observation that most harmful tax regimes are associated with small countries. It is not clear, however, that preferential tax regimes are indeed more frequently used by small countries. Consider-
ering, for example, all 200 preferential tax measures evaluated in the Primarolo Report for the EU–15 member states (independent of whether they were eventually classified as “harmful” or not), the five large members—France, Germany, Italy, Spain and the United Kingdom—accounted for almost exactly 100, or 50 percent, of these measures. By this indicator, preferential tax regimes are indeed ubiquitous, used by small and large countries alike. However, as the above model shows, small countries levy lower tax rates on both types of capital and, hence, are able to attract some of the large countries’ tax base to their jurisdiction (see eq. [9]). This may be an explanation of why the preferential tax regimes set up by small countries are more likely to be evaluated as “harmful.”

Again the smaller country, A, chooses the lower tax rate in equilibrium.

Substituting each country’s non–cooperative tax rate [13] and [5] into [12] gives optimized per–capita tax revenue in each country in the non–discriminatory tax regime:

\[
T^A_{ui} = \frac{b_1 b_2 (K_1 + K_2)^2 (1 + s^A)^2}{9 s^A (s^A)^2 (b_1 + b_2)} ,
\]

\[
T^B_{ui} = \frac{b_1 b_2 (K_1 + K_2)^2 (1 + s^B)^2}{9 s^B (s^B)^2 (b_1 + b_2)}
\]

Comparing the two expressions in [14] shows that per–capita tax revenue is again higher in the smaller country:

\[
T^A_{ui} - T^B_{ui} = \frac{b_1 b_2 (K_1 + K_2)^2 - b_1 b_2 (K_1 + K_2)^2}{9 s^A (s^B)^2 (b_1 + b_2)} (s^B - s^A) (1 - s^A s^B) > 0.
\]

The core question is whether tax revenues in each country are raised or lowered when the non–discrimination rule is introduced. In contrast to the symmetric case, we must also consider the possibility that one country gains, but the other country loses, from the constraint to set a uniform tax rate on both capital tax bases. Forming the difference between optimized tax revenue in the two different scenarios gives

\[
T^A_{ui} - T^B_{ui} = \frac{(1 + s^A)^2}{9 s^A (s^B)^2} \Omega,
\]

\[
T^B_{ui} - T^A_{ui} = \frac{(1 + s^B)^2}{9 s^A (s^B)^2} \Omega,
\]

where the common factor \( \Omega \) is given by

\[
\Omega = \frac{(b_1 b_2 - b_1 b_2)^2}{(b_1 + b_2)^2} \geq 0.
\]

\(^5\) Indeed, while the small EU member states accounted for only 50 percent of the total number of preferential tax regimes evaluated in the Primarolo Report (1999), they were responsible for roughly 75 percent of the 40 discriminatory measures in EU member states (without associated territories) that were eventually singled out for censure. Nevertheless, among the large countries, France was still responsible for four of these measures, Spain for three, and Germany and Italy for one each.
This expression must be non-negative, and will equal zero only if \( b_1 k_1 = b_2 k_2 \). As in Keen (2001), the uniformity constraint will not affect tax revenues if both tax bases are equally mobile, so that no preferences arise in the unconstrained equilibrium. Otherwise, both countries lose from the non–discrimination constraint and Keen’s finding generalizes to the case where countries differ in size. To understand the intuition for this result, it is useful to start with the benchmark case of symmetric countries. In this case, both countries raise the tax rate on the more mobile base due to the non–discrimination constraint, but also reduce the tax rate on the less mobile base, relative to the case of differentiated tax setting. As the tax rate on the more mobile base is increased, it becomes more attractive to compete for this base. Hence, tax competition will be intensified, on average, and the uniform tax rate will be below the (arithmetic) average of the differentiated tax rates.

This reasoning continues to hold when countries differ in size. Recall from [8] that, if tax discrimination is allowed, the ratio of tax rates, \( t_1^i / t_2^i \), and, thus, the degree of tax discrimination is the same in both countries. Therefore, the restriction to impose a uniform tax rate will affect both countries symmetrically. Revenue changes are, thus, solely determined by the adjustment in the average rate of capital taxation and equilibrium tax revenue will fall in both countries as a result of the non–discrimination constraint.

Finally we emphasize that qualitatively similar results would be obtained if the assumption that policy makers maximize tax revenues only were relaxed. To see this, assume for simplicity that a region’s share in the total endowment \( k = k_1 + k_2 \) were the same for both types of capital. Suppose as well that policy makers in each region maximize a weighted sum \( x + \varepsilon T \) of residents’ private consumption \( x \) and tax revenue per capita \( T \), with the weight \( \varepsilon \) on government revenue exceeding one (to ensure positive tax rates in equilibrium). Then it will still be the case that the ratio of regions’ equilibrium tax rates depends only on their relative populations. Equation [9] will continue to hold, so that introducing a non–discrimination constraint will not affect the allocation of capital. Preventing discrimination will leave unchanged equilibrium total income \( x + T \) in each region, raising private income \( x \) but lowering tax revenues \( T \). As tax revenues have a higher welfare weight than private income, the overall impact must, thus, be a reduction in welfare in each region.

**CONCLUSION**

In this note, we have extended Keen’s (2001) analysis of symmetric tax competition under discriminatory and non–discriminatory tax regimes to allow for size differences between countries. In both regimes, the well–known result reappears that the smaller country levies lower tax rates than its larger neighbor and a redistribution of tax revenues occurs, in the Nash equilibrium, from the larger country to the smaller country. Nevertheless, a non–discrimination policy will have similar effects as in the symmetric model: it reduces the average level of capital taxation and, thus, tax revenues in both countries.

The results in this note may be relevant for the non–discrimination policies enacted at the OECD and EU levels, which are primarily targeted at the tax practices of small countries. They reinforce the warning that such partial coordination policies can be welfare–reducing when countries are free to set (uniform) tax rates independently. It should be emphasized, however, that our

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6 See Janeba and Smart (2003, p. 266), who term this the “strategic effect” of the restriction.

7 This follows from [16] and the fact that the aggregate tax base \( k_1 + k_2 \) is the same for each country in the discriminatory and non–discriminatory regimes. The proof is available from the authors.
findings do not invalidate the arguments raised in the literature in favor of a ban on tax discrimination (see Janeba and Smart (2003), Haupt and Peters (2005), and Bucovetsky and Haufler (forthcoming)). Instead, the main purpose of our analysis has been to show that the symmetry assumption used in much of this literature is perhaps less crucial than first intuition may suggest. At least this seems true for the type of industry-specific tax discrimination measures on which this analysis has focused.

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