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TAX EVASION, TAX COMPETITION AND THE GAINS FROM NONDISCRIMINATION: THE CASE OF INTEREST TAXATION IN EUROPE

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This paper uses a game–theoretic approach to analyse the taxation of interest income in Europe in the presence of tax evasion. The model allows us to assess the success of various reform proposals. We argue that the tax treatment of nonresidents' interest income plays a crucial role. When decisions on discrimination and on withholding tax rates are made non-cooperatively, the outcome is similar to a prisoners' dilemma. All countries discriminate, but in equilibrium internationally mobile portfolio capital evades taxation successfully. In contrast, if all governments did not discriminate, tax competition leads to less tax evasion.

The integration of capital markets in Europe has brought various benefits. At the same time, however, governments struggle to contain tax evasion. International capital flight as an attempt to evade taxes is particularly relevant in the area of taxation of interest income. Banking secrecy laws in some EU countries and low tax rates in small countries like Luxembourg, which boost its role as financial centre, have led to the effective elimination of the taxation of interest income for some investors. *The Economist* speaks, not surprisingly, about 'The Disappearing Taxpayer' (May 31, 1997).

Several proposals have been made in order to overcome this situation.[1] The European Commission supports the introduction of a minimum tax rate and/or the status of a community resident. Under the concept of a community resident a country's tax on interest income is independent of the residence of the investor (practically realising the source principle). By contrast, a proposal of the OECD (1977) argues in favour of a maximum withholding tax rate on interest income. None of these proposals has been unanimously accepted since gains and losses from non–coordinated policies differ greatly across member states. The main beneficiary of the present situation is Luxembourg which attracts large amounts of foreign capital, in particular from Germany. The United Kingdom opposes any coordination for political reasons and because tax coordination may also threaten London's role as the leading financial centre in Europe. In contrast, Germany sticks to its traditional bank secrecy law which enables resident investors to evade German taxation by investing abroad.

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[1] For a survey of proposals of the EC Commission see Frank (1991). Huizinga (1994) discusses withholding taxes on interest income from a policy perspective. He focuses on the impact of withholding taxes on financial markets and financial institutions. A broad discussion of EU tax issues can be found in Cnossen (1990).

The purpose of this paper is to model the situation of non–coordinated tax policies in the presence of tax evasion in order to assess the success of the various reform proposals. For this purpose, we allow governments to choose whether they discriminate against nonresidents or not. Discrimination takes the form of differential tax rates on residents and nonresidents. We thereby contribute to the literature on tax competition by endogenising the set of tax rates from which each government chooses. At first glance, it seems advantageous to have a larger set of tax instruments. We will show, however, that the incentive to discriminate is common to all governments, and, in equilibrium leads to no taxation of internationally mobile portfolio capital. This outcome is similar to a prisoners' dilemma and reflects the current situation in the EU. The introduction of the status of a community resident, which in our model is equivalent to no discrimination by all governments, would make governments weakly better off in terms of revenues. In fact, we show that under nondiscriminatory taxation governments are quite successful in combating tax evasion, relative to the set of tax instruments.

The tax treatment of nonresidents' interest income plays also a role in the analysis of Razin and Sadka (1991). They assume that countries are small and cannot influence the net return on investment. In that case policy coordination cannot improve upon the noncooperative status quo. In contrast to Razin and Sadka we believe that countries like Luxembourg, though small in terms of population or size, exert market power with respect to internationally highly mobile portfolio capital.[2]

The setup of our tax competition model is motivated by experiences with withholding taxes in the United States (Goulder, 1990), and in particular the differential tax treatment of residents and nonresidents in Germany's unilateral attempts to tax interest income in 1989 and 1993 (see, for example, Nöhrbass and Raab, 1990; Schlesinger, 1990; Deutsche Bundesbank, 1994). In both cases huge capital amounts fled Germany and were invested in Luxembourg where foreigners' interest income is tax free. Interestingly, the 1989 legislation was a failure because the attempt of taxing nonresidents hurt only the German government via higher interest rates on debt. Since 1993 nonresidents have been exempted from the withholding tax.

1. The Model

The economy consists of two countries, labelled *A* and *B*. Both countries are inhabited by a large number of investors. Some investors evade personal taxes on interest income. The government of each country tries to combat tax evasion, but is restricted to use withholding taxes on interest income. The government objective is to minimise tax evasion which is equivalent to maxi-

[2] See, for example, *The Wall Street Journal* 'Tiny Luxembourg cashes in on Germany.' November 16, 1994. Note that noncooperative tax seeting may be constrained efficient even when countries are large, as shown in Bucovetsky and Wilson (1991). They show this to be true if governments control source and residence-based taxes which is in contrast to our model.

mising tax revenues.[3] For simplicity, we do not explicitly model the decision problem of tax evaders. Their behaviour is indirectly represented in the government revenue function. We distinguish, however, between two types of tax evaders and therefore two types of tax bases. First, there are some evaders who never invest abroad. These individuals might either face too high transaction costs, or are too risk averse regarding exchange rate fluctuations, or are simply incompletely informed about foreign investment opportunities. This implies that each government can extract revenues from a domestic non–mobile tax base. The second type of tax evader is one who always shops for the lowest tax rate. Thus there is an internationally mobile tax base which always locates in the low–tax country. Both tax bases respond elastically to (the minimum) tax rate because with higher tax rates evaders make portfolio adjustments.[4]

Tax bases and therefore revenue functions are represented in a reduced form. Denote by $R_j(t_j)$, $j = a, b$, the revenue functions of country A's and country B's domestic tax base as functions of the tax rates t_a, t_b. Let $R_m(t_m)$, $t_m = \min\{t_{am}, t_{bm}\}$, be the revenue function of the mobile tax base as function of the smaller of the two tax rates. We impose the following mild assumptions on all revenue functions ($j = a, b, m$): $R_j(0) = 0$ and $R_j(t_j) \geqslant 0$, each revenue function $R_j(t_j)$ is continuously differentiable if $R_j(t_j) > 0$, and each revenue function is single-peaked and has a unique maximum at $t_j^o = \arg\max_{t_j \in [0,1]} R_j(t_j)$. Our assumptions are compatible with a revenue function which looks either like a bell-shaped curve (e.g. the standard Laffer curve), or an increasing function (e.g. a completely inelastic tax base).

We now wish to analyse the following two-stage game. In the first stage, governments decide whether to discriminate against the mobile tax base. Discrimination is possible by imposing differential tax rates on the two tax bases, i.e., $t_i \neq t_{im}$, $i = a, b$. We abbreviate discrimination and nondiscrimination by D and N. In the second stage governments simultaneously choose tax rates. Governments are forward looking and therefore we solve for the subgame-perfect equilibrium.

1.1. *Nondiscriminatory Taxation*

We first analyse the case in which both governments do not discriminate (N, N). The uniform tax rate of government i is denoted t_i. Since the mobile tax base always locates in the low–tax country, we can define three different regions. Let $\mathscr{E}$ be the set of tax rates $\{(t_a, t_b) \in [0, 1] \times [0, 1] | t_a < t_b\}$ such

[3] This is not the same as assuming that the government is of Leviathan type (see Edwards and Keen, 1996, for a discussion of the Leviathan hypothesis). Our model is based on the fact that in EU countries interest income is taxable. This is also the motivation behind Germany's second attempt to tax interest income. The German Supreme Court ruled that income must be taxed comprehensively for horizontal equity reasons.

[4] The elasticity of tax bases plays an important role in proving existence of a Nash equilibrium in tax rates. As it was shown by Schulze and Koch (1994), no Nash equilibrium exists when all tax bases are completely inelastic and all governments do not discriminate. On the other hand, Razin and Sadka (1991) show that an equilibrium exists if the amount of capital invested in a country changes continuously in the net return on capital and countries are small.

that country A attracts the mobile tax base. Define in the same way the set $\mathscr{B}$, and also set $\mathscr{T}$ which is the set of equal tax rates. Assuming w.l.o.g. that the mobile tax base is split evenly when $t_a = t_b$, we can write government A's revenue function (and similarly for government B)

$$Z_a(t_a, t_b) = \begin{cases} R_a(t_a) + R_m(t_a) & \text{if } (t_a, t_b) \in \mathscr{A} \\ R_a(t_a) + R_m(t_a)/2 & \text{if } (t_a, t_b) \in \mathscr{T} \\ R_a(t_a) & \text{if } (t_a, t_b) \in \mathscr{B}. \end{cases}$$

We wish to characterise the Nash tax rates (t_a^*, t_b^*) of the (N, N) subgame. For this purpose it is helpful to consider Fig. 1 which shows a typical payoff function for government A if it always attracted the mobile tax base ($t_b = 1$). The left peak is the sum of the revenues from the domestic and the mobile tax base. The right peak shows the revenues from the domestic tax base. The tax rates corresponding to the two peaks are denoted by t_a^+ and t_a^o. If $t_b < 1$ and $R_m(t_b) > 0$, a discontinuity arises at $t_a = t_b$ where both countries share the tax revenue from the mobile tax base.

In Fig. 1 we illustrate also that each government can guarantee itself a certain level of tax revenues. Each government exploits its own domestic tax base optimally through t_j^o. No government will ever accept revenues less than $R_j(t_j^o)$, $j = a, b$. This is called the 'inside option'. The figure shows a limit tax rate, t_a^L, which is the smallest tax rate such that the revenues from both tax bases, the domestic and the mobile, are at least as high as from the 'inside option'. More formally, the limit tax rate is defined as

$$t_j^L = \arg\min_{t_j} [t_j \text{ s.t. } R_j(t_j) + R_m(t_j) \geqslant R_j(t_j^o)].$$

The limit tax rate is a threshold up to which government A is willing to undercut its opponent and it determines a government's potential to attract the mobile tax base. Clearly, the winner of the mobile tax base must choose a tax rate which does not exceed the limit tax rate of its opponent. The country

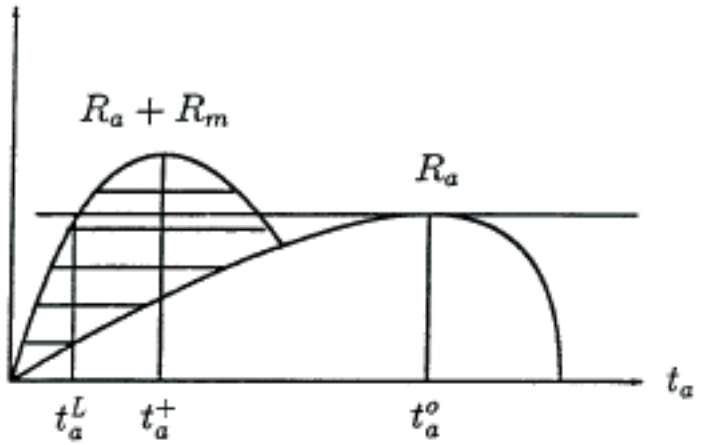

Fig. 1: *Payoff function government A*

with the lower limit tax rate is the only candidate for attracting the mobile tax base. To avoid a clumsy notation, and without loss of generality, we assume $t_a^L \leqslant t_b^L$. A Nash equilibrium in pure strategies under (N, N) must then satisfy:

$$(i) \qquad t_a^* = t_a^+ = \arg\max_{t_a}[R_a(t_a) + R_w(t_a)]$$

$$(ii) \qquad t_b^* = t_b^o = \arg\max_{t_b} R_b(t_b) \qquad (1)$$

$$(iii) \qquad t_a^* = t_a^+ \leqslant t_b^L.$$

When $t_a^* < t_b^*$, the mobile tax base locates in A and conditions (i) and (ii) have obvious meaning. However, the first two conditions do not rule out B's incentive to undercut. For existence of a Nash equilibrium we impose the additional condition (iii).[5]

We are now in a position to analyse how successful governments are in combating tax evasion under nondiscrimination. We call governments *weakly successful in combating tax evasion* if there exists a tax rate tuple $(\hat{t}_a, \hat{t}_b)$ such that there exist no other tax rate combination that makes at least one government strictly better off without making the other worse off. We can strengthen the notion of success as follows. Governments are said to be *strongly successful in combating tax evasion* if there exists a tax rate tuple $(\hat{t}_a, \hat{t}_b)$ such that there exists no other tax rate tuple that increases the sum of revenues. We then have

PROPOSITION 1: *Suppose that both governments do not discriminate against non-residents and* $t_a^+ \leqslant t_b^L \leqslant t_b^o$. (a) *In equilibrium governments are weakly successful in combating tax evasion. Moreover, if* (b) $t_a^o < \min\{t_w^a, t_b^o\}$, *or if* (b') $t_a^o < t_b^L$, *then governments are strongly successful.*

Proof: (a) Consider an equilibrium with unequal tax rates, e.g. $t_a^* = t_a^+ < t_b^* = t_b^o$. We then have $\forall t_a' \neq t_a^+ \; R_a(t_a^+) + R_w(t_a^+) > R_a(t_a') + R_w(t_a')$. If country A could do better by exploiting its domestic tax base, it would have done that and t_a^+ would not be a Nash equilibrium. The same holds for country B, which cannot gain by undercutting according to property (iii) in (1). (b) The condition ensures that country A maximises its inside option at a tax rate lower than where the revenue from the mobile tax base is maximised. Hence, $t_a^* = t_a^+ > t_a^o$. Now, assume on the contrary that $\exists\,(t_a', t_b') \neq (t_a^+, t_b^o)$ such that $Z_a(t_a', t_b') + Z_b(t_a', t_b') > Z_a(t_a^+, t_b^o) + Z_b(t_a^+, t_b^o)$. Then, (t_a', t_b') must lie in set $\mathscr{B}$ since (t_a^+, t_b^o) maximise $Z_a + Z_b$ in $\mathscr{A}$ and $\mathscr{T}$. On the boundary of set $\mathscr{B}$, i.e. $t_a = 1$, governments cannot be strongly successful since $t_a = 1$ contradicts $t_a^o < \min(t_w^o, t_b^a)$. When (t_a', t_b') maximise the joint revenue in the interior of $\mathscr{B}$, then $t_a' = t_a^o = \arg\max_{t_a} R_a(t_a)$ and $t_b' = t_b^+ = \arg\max_{t_b}[R_b(t_b) + R_w(t_b)]$. However, this contradicts $t_a^o < t_a^+ < t_b^+$, since

[5] It is also possible that a Nash equilibrium is characterised by identical tax rates. Then the mobile tax base must vanish at the equilibrium tax rate. If this were not the case, either country could undercut the opponent's tax rate and attract the mobile tax base.

(t'_a, t'_b) should be an element of $\mathscr{B}$. Hence, the joint maximum cannot be in $\mathscr{B}$. (b′) The arguments in case of $t^o_a < t^L_b$ are similar. A tax tuple (t'_a, t'_b) which leads to a joint revenue exceeding that of the Nash equilibrium must be an element of $\mathscr{B}$ and therefore $t'_a = t^o_a > t'_b = t^+_b$. This, however, contradicts $t^o_a < t^L_b$. □

The intuition for this result is simple. Each country effectively plays only one of two strategies: either t^o_j or t^+_j. No equilibrium in pure strategies exists when both play the latter. When both governments play the former, and an equilibrium exists, then taxing the mobile tax base is also not worth from their joint perspective. This leaves the asymmetric cases. If an equilibrium exists, then both governments play the strategy which maximises their payoff.

1.2. *Subgame Equilibria Involving Discrimination*

We now turn to the remaining subgames of the second stage of our game, in which at least one government applies discriminatory taxation ((D, D), (D, N) and (N, D)). The concept of a limit tax rate is also helpful for understanding the following results. The limit tax rate of a government which discriminates is zero because the costs of undercutting are zero.

In subgame 2 (D, D) both governments can exploit their domestic tax base at a maximum because limit tax rates are zero. This implies also a Nash equilibrium with zero revenues from the mobile tax base. Thus governments are not successful in combating tax evasion as far as internationally mobile portfolio capital is concerned.

In subgames 3 and 4, $(N, D)/(D, N)$, the government which discriminates (government D) exploits its domestic tax base at a maximum. It also undercuts the government which does not discriminate (government N). A Nash equilibrium in pure strategies does not always exist however.[6] Similar to condition (iii) in section 1.1, a necessary condition for existence is that t^o_m is smaller than the limit tax rate of government N. Governments are successful in combating tax evasion because all tax bases are exploited to the greatest possible extent.

1.3. *Discrimination Is Self–defeating*

We now wish to solve the first stage of our game in which each government chooses between D and N and anticipates how tax rates are set in the second stage. Note that the entire game is well defined if an equilibrium in all subgames exists. An equilibrium in the subgame (D, D) always exists. The condition $t^o_m < t^L_g$ guarantees existence under $(N, D)/(D, N)$, while the condition $t^+_g \leqslant t^L_g$ restates the condition for (N, N). Fig. 2 summarises the payoffs for the four subgames. In each cell the upper right entry refers to

[6] Suppose, for example, that government D tries to exploit the mobile tax base optimally, but the optimum tax rate t^o_m exceeds the limit tax rate of government N. Then, undercutting is profitable for government N. Hence, a Nash equilibrium does not exist.

country because there are always two governments who compete for this tax base. It is straightforward to show then that in a three-country model with the same structure as above, the following strategies are part of a subgame-perfect equilibrium: All three governments choose to discriminate and each country's internationally mobile capital is untaxed.

2. Conclusions

In this paper we try to capture the main features of the current tax treatment of interest income in the European Union. Internationally mobile capital escapes taxation by moving to tax havens like Luxembourg. By contrast, internationally immobile capital is taxed at least through national withholding taxes. In our model this situation is explained as the outcome of a tax competition game between member states of the EU which discriminate against nonresidents. We have abstracted from the fact that the EU capital market is not closed and capital often flees to tax havens outside of the EU. This, of course, aggravates the tax evasion problem.[9] Our analysis suggests that even when capital flight to non-EU countries is not a major problem, coordination within the European Union is difficult, in particular if bank secrecy laws and the unanimity decision rule for EU decision making are maintained.

The European Commission's proposal of introducing the community resident is interesting because it aims at solving the prisoners' dilemma. The proposal corresponds to the (N, N) case in our theoretical model and would (weakly) improve governments' success in combating tax evasion compared to (D, D).[10] It is not clear, however, whether this proposal would find sufficient support in the EU. Agreeing upon (N, N) means that the country with the lowest 'inside option' is the best candidate for attracting the mobile portfolio capital. Thus, big countries like France or Germany would continue to play their inside option and do not benefit from the proposal. Luxembourg, the likely winner, is not expected to compensate the other member states for their agreeing.[11] Alternatively, governments may consider introducing a minimum tax rate in order to avoid a beggar–thy–neighbour policy.[12] A minimum tax rate on the mobile tax base in the (D, D) regime might be even more

[9] For a recent analysis of capital flight to EU and non-EU countries see Huizinga and Nielsen (1997). Their paper does not consider investors in EU tax havens and the issue of tax discrimination.

[10] From a theoretical perspective it is not entirely clear why countries are able to write contracts on principles, but not on tax rates. A possible explanation is that tax bases and therefore optimal tax rates are uncertain at the time when governments choose whether to discriminate or not. It is then very costly or even impossible to write a contract with state-dependent tax rates. By contrast, it is conceivable that countries agree on nondiscrimination before the shock is realised. We are grateful to Tim Besley who brought the issue of contractibility to our attention.

[11] A referee pointed out that larger countries may benefit indirectly from introducing the concept of a community resident if tax credits for source taxes raise the amount of self-reporting. The role of tax credits for self-reporting is beyond the present paper and may alter our conclusion if the effect is sufficiently strong.

[12] Kanbur and Keen (1993) analyse the role of a minimum tax in the context of commodity tax competition.

attractive. Both governments gain and the mobile tax base is taxed at a maximum when $t_{min} = t^a_{tx}$. Whether this option is feasible depends also on the extent capital is mobile to non-EU tax havens.

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