Società italiana di economia pubblica

XIX CONFERENZA

ECONOMIA DEL CAPITALE UMANO
Istituzioni, incentivi e valutazioni

Pavia, Aule storiche Università, 13 - 14 settembre 2007

EXIT AND VOICE. YARDSTICK VERSUS FISCAL COMPETITION ACROSS GOVERNMENTS

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pubblicazione internet realizzata con contributo della COMPAGNIA di San Paolo

Exit and voice. Yardstick versus fiscal competition across governments.

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16 Febraury 2007

Abstract

Politicians are disciplined through the electoral system. But this is often no enough to eliminate political rents. Economists suggest that competition across governments may also help. But intergovernmental competition can take two forms, through tax competition (exit) or yardstick competition (voice). We show these two forms may not, and in general do not, work in the same direction. Tax competition reduces the screening properties of yardstick competition.

1 Introduction[1]

In modern democracies, the fundamental way we use to discipline governments is through elections. Bad or incompetent governments are thrown out of office and this threat forces them to behave in the interests of voters. Many observers however would agree that the electoral mechanism alone may not be powerful enough to fully achieve these objectives and that additional disciplining devices on politicians may be helpful. Not surprisingly, the economists' main contribution to this debate has been to advocate more competition across governments. As competition across firms reduces extra profits in the market, so competition across governments would reduce political rents. This general idea has taken two main forms, aptly summarized by Albert Hirschman's famous distinction

[1] This paper started as a joint research project with Enrico Minelli at CORE in May 2001. At the time, we were unaware that the topic was already briefly touched in a recent working paper by Timothy Besley and Michael Smart. When we eventually found out, we thought their approach and modelling was too close to ours to deserve a separate analysis and we dropped the project. However, after many years, subsequent discussions with colleagues, and the fact that our results diverged from theirs in some crucial aspects finally convinced me that there may be some value added in making our original work known to the profession. Thus, I decided to work through our notes and finish the paper. Enrico Minelli was at the time too busy to work on the revised version. This is why the paper appears under my name only.

between "exit" and "voice" (Hirschman, 1970). According to the former, people may escape from too greedy a government either by migrating altogether, as in the Tiebout's tradition, or more realistically, by transferring abroad their mobile assets (Brennan and Buchanan, 1980). It would be difficult to overestimate the practical influence of this idea. For example, in the debate on the fiscal institutions of the European Union, tax competition (on capital) among member countries is often defended on the grounds of its disciplining effects on the hefty European governments. But there is also a second version of the same idea. Competition across governments might also improve the information set of voters (Salmon, 1987). With competing governments and correlated economic environments, citizens may also engage in more relative performance evaluation (also known as "yardstick competition") across politicians, using observations about the results of governments of other regions or other countries to infer something about the quality of their own governments, so reinforcing the disciplining effects of "voice". According to its supporters, both globalization, with its increase in correlation across national economies, and increased media coverage concur to reinforce the practical relevance of this form of disciplining device. Indeed, tax competition and yardstick competition may also go hand to hand; in the EU, for instance, the increased integration of markets and politics, coupled with increased mobility of factors, have certainly worked in the direction of reinforcing both forms of governmental competition.

Fiscal and yardstick competition have been separately scrutinized at large in the economic literature, both theoretically and empirically[2]. We now know a great deal about their effects on social welfare as well as on their economic practical relevance. Their link, however, has not been addressed with the same attention. In the debate on fiscal federalism, for example, it is customarily taken for granted that both types of competition would reinforce each other. Decentralization, so is argued, has potentially beneficial effects on governments because it increases *both* fiscal competition *and* yardstick competition. But is this true? Or these two mechanisms interfere the one with the other?

Surprisingly enough, this question has never been raised in the literature, at least not in formal analysis. The only paper (I am aware of) which briefly touches this issue is a (just published) work by Besley and Smart (2007). However, they are more generally concerned with the effects of several general fiscal restraints on voter's welfare and do not pay detailed attention on this particular issue. As the topic is relevant, It is instead important to highlight the conditions under which tax competition and yardstick competition work together or one against the other. To this aim, in the following I build a model which helps us focussing more on this issue.

The main results of this paper are as follows. First, I show that there is no a-priori reason to believe that the effects of the two forms of competition should necessarily go in the same direction. Fiscal competition works by reducing the resources a "bad" government can lie his hands on; yardstick competition works by providing the voter with more information to select between "bad"

[2] See the references at the end of paper.

and "good" governments. As the two mechanisms are basically different, it is not surprising that they may not go in the same direction. Second, I also show if there is a general tendency, this clearly points to a conflict between the two forms of competition. Intuitively, fiscal competition, by constraining government's choices on some tax tools, makes less informative the signal (the tax rates) that voters could use to select between bad and good politicians through yardstick competition. In our model, this translates into a larger set of parameters which would support pooling equilibria (between good and bad governments) under tax competition than without it. Third, I finally show that there is at least one practical important case where the two forms of competition unambiguously conflict. When public expenditure is particularly rigid downward, because it is formed by public goods which are deemed as important by voters, increasing tax competition unambiguously reduces the informational advantages of yardstick competition. The situation of the European countries, with their large welfare systems, comes naturally to mind.

The rest of the paper is organized as follows. Section 2 sets up the model, considering both the case with and without tax competition. Section 3 introduces electoral motivations. Section 4 introduces yardstick competition. Section 5 compares the different mechanisms and derives the basic results of this paper. Section 6 illustrates our results by means of a simple example and some simulations. These are also briefly compared with the Besley and Smart (2007) results in section 7. Section 8 concludes.

2 The model

To ease comparison, the model I focus on is the canonical one used in this type of literature, firstly introduced in a seminal paper by Besley and Case (1995) and then developed by a number of other authors. The only difference is that I enrich the tax structure of the economy, as this is the focus of the present analysis. Consider then an economy with a large number of identical consumers (voters). Each consumer derives utility $u(.)$ from a private good c , a (per capita) public good g and leisure $x = (1 - l)$, where l indicates labor supply. As customary in political economic models (i.e. Persson and Tabellini, 2000), I assume the quasi-linear form

$u = c + H(g) + V(1 - l)$

so as to eliminate income effects on both the consumer's demand for the public good and the supply of labor. Both $H(.)$ and $V(.)$ are increasing and strictly concave functions of their arguments. Each consumer owns one unit of leisure and one of a private good, which we later identify with "capital". This unit of capital can be invested earning a fix return. To save notation, I just set this fix return equal to one. Labor wage is also normalized to one. Governments can then raise tax revenue by taxing either or both capital and labor income; the consumer's budget constraint can then be written as:

$c = (1 - T) + (1 - t)l$

where T and t indicate, respectively, the tax rate on capital and on labor income and $T, t \in [0, 1]$. Governments can then use tax revenue to either produce the public good and/or to accumulate political rents. The production function of the public good is stochastic: one unit of revenue produces $\overline{\epsilon}$ units of public good when the shock is positive and $\underline{\epsilon}$ units of the public good when the shock is negative, with $\overline{\epsilon} > \underline{\epsilon} > 0$. Positive shocks occur with probability $q > 0$. Government's budget constraint is:

$r = (T + tl) - \frac{g}{\epsilon}$

where r indicates (per capita) rents and $\epsilon = \{\overline{\epsilon}; \underline{\epsilon}\}$. Governments come of two types. They are either Welfarist governments (or "good" governments) or they are Leviathan governments (or "bad" governments). The former are only interested in maximizing the utility of the consumers; the latter are only interested in maximizing political rents. Good governments occur with ex ante probability $\theta > 0$. For technical reasons (in order to guarantee the existence of a pooling equilibrium in pure strategies in all cases considered below, see note), I assume thorough the paper that $\theta > \frac{1}{2} > q$.The respective utility functions of the two types of government is then:

$W(T, t, g) = u(T, t, g)$

and

$L(T, t, g) = r = T + tl - \frac{g}{\epsilon}$

where, again to save notation, I here use $u(T, t, g)$ to indicate the *indirect utility* of the representative consumer given government choices (see below).

In order to solve the model, let us begin with the simplest case where the economy is closed (consumers cannot export their capital abroad) and lasts only one period, meaning that the incumbent government is in charge for all the period. I assume the following time line. At stage 0, nature moves, choosing a realization for ϵ and a type of government; at stage 1, the incumbent government moves, by choosing the tax rates on capital and labor; at stage 2 consumers make their choices and so tax revenue is also determined, and finally at stage 3 the incumbent government decides how to split this revenue between rents and public good supply. As usual, the model is solved by working backward. The last choice is a particularly simple one. Welfarist governments do not receive any utility from rents, so they always choose $r = 0$, and use all tax revenue to finance public good supply. Viceversa, Leviathan governments do not care for public expenditure, and so they choose $g = 0$ and use all tax revenue to accumulate rents. Going up at stage 2, private sector's choices are also particularly simple. If the economy is closed, capital can only be invested at home, so the only choice the consumer needs to make at this stage concerns her labor supply. The consumer then maximizes max $u = (1-T) + (1-t)l + H(g) + V(1-l)$

l

taking (T, t, g) as given[3]. The first order condition gives:

(1) $(1-t) - V_x(1-l^*) = 0$

where thorough the paper subindex indicate derivatives and asterisks optimal values. Solving , we get :

$l^* = 1 - V_x^{-1}(1-t) \equiv L(t)$

where concavity of $V(.)$ implies $L_t(t) < 0$. For future reference let us indicate with $\widetilde{\sigma}(t) \equiv -((L_t(t)t)/L(t))$ the tax elasticity of labor supply, and let us also assume $\widetilde{\sigma}_t(t) > 0$ so as to guarantee the second order condition for government maximization (see below)[4].

Finally, at stage 1, the incumbent government chooses taxes by taking into account the effect of these choices on the behavior of the consumer in the second period. If the incumbent government is a Welfarist, he would then choose (T, t) so as to maximize:

$W(T, t, g) = u(T, t, g) = (1-T) + (1-t)L(t) + H(\epsilon(T + tL(t))) + V(1-L(t))$

Using (1), the first order conditions for this problem can be written as:

(2) $T : -1 + \epsilon H_g(.) \geq 0, \ \ T \leq 1$

(3) $t : -L(t) + H_g(.)\epsilon(L(t) + tL_t(t)) = -L(t) + H_g(.)\epsilon L(t)(1 - \widetilde{\sigma}(t)) \leq 0$, $t \geq 0$.

Note that if the optimal choice in (1) is such that $T^* \leq 1$, $H_g(g^*) = \frac{1}{\epsilon}$; substituting in (3), we get $-\widetilde{\sigma}(t)) < 0$, implying $t^* = 0$. This makes perfect sense; a Welfarist government would never choose a distorting form of taxation as the labor tax, if he had at this disposal (enough) of a no distorting source of revenue such as the capital tax. Let us assume this to be the case for any possible realization of ϵ.

However, the realization of ϵ will generally affect the optimal level of public good supply and the capital tax chosen by the Welfarist government. To see how, and for future reference, suppose for a moment that ϵ is a continuous variable and let us differentiate (2) with respect to ϵ :

[3] Tax rates have already been chosen, and the single consumer is too small to affect g in any way.

[4] Labor economists usually define a (net) wage elasticity of labor supply as $\sigma(w) \equiv -((L_w(w)w)/L(w))$, where w is the net- of-tax wage. In the present model, $w = (1-t)$, so that $\widetilde{\sigma}(t) = \frac{t}{1-t}\sigma(1-t)$. Notice that $\widetilde{\sigma}_t(t) > 0$ even if the wage elasticity is a constant, e.g. if $\sigma(1-t) = \sigma$. As customarily, we will use this constant wage elasticity formulation in the simulations of section 6 below.

(4) $\frac{dT}{d\epsilon} = -\frac{H_g + gH_{gg}}{\epsilon^2 H_{gg}} = -\frac{g}{\epsilon^2}(\frac{H_g}{H_{gg}g} + 1) = -\frac{T}{\epsilon}(1 - \frac{1}{\mu}) = \frac{T}{\epsilon\mu}(1 - \mu)$

where $\mu = \left|\frac{H_{gg}g}{H_g}\right| > 0$ is the elasticity of the marginal utility for public expenditure (e.g. the reciprocal of the price elasticity of the demand for the public good $(\frac{1}{\mu})$, if the public good could be bought on the market). It follows:

(5) $\frac{dg}{d\epsilon} = \frac{d}{d\epsilon}(\epsilon T(\epsilon)) = T + \epsilon(\frac{dT}{d\epsilon}) = T(1 + \frac{(1-\mu)}{\mu}) = \frac{T}{\mu}$

In words, the faster the marginal utility of public good consumption falls when public good is reduced, the more the consumer would be willing to pay to avoid this reduction. Hence, the capital tax is larger or smaller when the shock is positive depending on μ being larger or smaller than one; and public expenditure is larger when the shock is positive. Note however that if $\mu \longmapsto \infty$ (the demand for the public good is perfectly rigid), the optimal g is unaffected by the shock; in this case, the public good is so important for the consumer that even in the presence of a negative shock, capital tax is raised to as to guarantee an unchanged level of public good supply. We will come back to these results later.

We can then summarize the choices of the welfarist government in the first period as $\mathbf{a}^G = \{t = 0, T = T^*(\epsilon), g = g^*(\epsilon)\}$ where $g^*(\epsilon) = H_g^{-1}(\frac{1}{\epsilon})$ and $T^*(\epsilon) = g^*(\epsilon)/\epsilon$.

The choices of the Leviathan government are even simpler, as the shock does not affect tax revenue. Whatever the realization of ϵ, the Leviathan would simply maximally tax the consumer so as to maximize his rents. His preferred choices are then $\mathbf{a}^B = \left\{t = \widehat{t}, T = 1; g = 0\right\}$, where $\widehat{t}$ is implicitly defined by the condition $\widetilde{\sigma}(\widehat{t}) = 1$.

These choices for the Leviathan are of course rather extreme. One may well image that there are reasons, perhaps constitutional limits on taxation or the simple threat of a revolution, that would forbid even a Leviathan government from completely expropriate his citizens. One could easily introduce these features in the model by imposing an exogenous maximum level on the rents a Leviathan can raise, and/ or by introducing a minimum level of public good he has to provide. Nothing essential would change in our results here. The reader may well substitute some $\overline{t} < \widehat{t}$ and some $g = \underline{g}$ in $\mathbf{a}^B$ (resulting in some maximum level of rents $\overline{r}(\epsilon) \equiv \overline{t}L(\overline{t}) + 1 - \underline{g}/\epsilon < \widehat{t}\,L(\widehat{t}\,) + 1)$ if he wishes to do so. However, as will soon be apparent, the assumption of an untamed Leviathan is the one which goes mostly *against* the main point I make here. So in the following I stick to it.

In this simple model, the consumer is then well off if the incumbent government happens to be a Welfarist; he is completely exploited if the incumbent government happens to be a Leviathan. Which would be the effect of opening the economy, so as to allow for capital mobility and *tax competition* across countries? In the second stage, the consumer would now also have the choice of exporting her capital abroad. Clearly, whatever the capital tax chosen by governments in the first stage, her best choice would be to move her endowment of capital so as to equalize the net-of-tax-return from capital across countries; as an effect, if capital is perfectly mobile, any capital tax at home larger than the capital tax applied abroad will drive away all capital from a country. In a (Bertrand) competitive equilibrium across countries, the tax on capital could then only be set equal to zero everywhere. Under less extreme assumptions (various forms of mobility costs), governments would retain some ability to tax capital, but capital taxation would drive away part of the capital from the country.

To avoid unnecessary complications, I capture this effect here by just assuming that when the economy is open, the tax base of the capital tax is reduced to $0 \leq \beta < 1$[5]. What would then be the effect on governments' choices and consumer's welfare? If $\beta < T^*(\epsilon)$ for any realization of ϵ, and the incumbent government is a Welfarist, the latter would now need to use the distorting labor tax to finance public expenditure. Equation (3) would now hold as an equality, and the optimal level of public good would then be determined by the equation $H_g(g^{c*}) = \frac{1}{\epsilon(1-\widetilde{\sigma}(t^{c*}))}$, where $g^{c*} = \epsilon(\beta + t^{c*}L(t^{c*}))$. Under tax competition, the optimal choices of the good government would then become $\mathbf{a}^{Gc} = \{t = t^{c*}(\epsilon, \beta), T = \beta, \ g = g^{c*}(\epsilon, \beta)\}$, where the subfix "$c$" here is just a reminder to the reader that these are the optimal choices under tax $c$ompetition. Note that in the formulas, I write the optimal t and g as function of β (in addition to ϵ) to indicate that the force of tax competition (the amount of the capital tax base driven away by capital taxation) will generally affect the optimal choices for both the public good and the labor tax levels. If the incumbent government is instead a Leviathan, under tax competition, his preferred choices would simply become $\mathbf{a}^{Bc} = \left\{t = \widehat{t}, T = \beta; g = 0\right\}$.

Is the consumer better off or worse off as an effect of tax competition? The answer clearly depends on the type of government. If the government is a Welfarist, tax competition makes her certainly worse off, as she has now to pay the dead-weight loss of taxation (in addition to tax revenue) and generally enjoys less public good[6]. She is instead better off if the incumbent government is a Leviathan, as she can now at least save some of her resources from expropriation. Clearly, there exists a value of θ^*, $0 < \theta^* < 1$, such that tax competition is ex ante welfare improving if $\theta < \theta^*$ and it is ex ante damaging for $\theta > \theta^*$.

[5] One could also make the more realistic assumption that β_i is continuos function of taxation, positing $\beta_i = \beta(T_i, T_{-i})$ and assuming that β is a non increasing function of own country tax rate, T_i. However, this would greatly complicate the algebra without adding any new particular insights to the point I am making here.

[6] More precisely, and leaving aside the efficiency effects of capital mobility across countries, consumers as a whole would be better off if capital mobility were prohibited, but each single consumer would be better off if she could escape taxation alone, leaving the other taxpayers to foot the bill. In an atomistic economy, free-riding behavior under capital mobility pushes the economy in a second best equilibrium.

3 Electoral incentives

This is the usual textbook story; but it is clearly too simple a story. In a democracy, bad governments are (sometimes) voted down by voters. Hence, even Leviathan governments may wish to reconsider their behavior, to avoid being thrown out of office and losing the opportunity to accumulate future rents. Following the literature, in order to capture these electoral incentives, I now just assume that the economy lasts two periods (or alternatively, that there is a term limit for holding offices). In the first period, things work precisely as described above, the only difference being that at the end of this period (that is, after the vector of political choices (T, t, g) has been realized) there is now an election, and the incumbent is either re-elected or he is substituted by an opponent. In the second period, whatever government is in charge, he will again select (T, t, g) following the three stages process described above. The world ends with the end of the second period. To provide electoral incentives to Leviathans, I also suppose that the realization of θ and q at stage 0 of the first period are private knowledge to governments; as usual, citizens only know the stochastic structure of the economy. Again, for simplicity, I also suppose that Welfarist governments do not play strategically; whatever the realization of the shock, they just do what is better for their citizens in that period[7]. This will allow me to fix out-of-equilibrium beliefs in a simple way in what follows.

As this is a dynamic game with incomplete information, the relevant notion of equilibrium is given by Bayesian Nash perfect equilibria; that is, equilibria where the strategies of each agent (the two types of incumbent government, the voter, and the opponent) are optimal given the strategies of any other agent, and where, whenever is possible, beliefs are sequentially rational in the sense that they are revised according to Bayes' rule. Similar game have already been solved several times in the literature (see in particular Besley and Case , 1995 and Bordignon et als., 2004) and the same arguments apply here too; so let us go through the solution quickly.

The model is solved backward. In the second period, as there are no elections at the end of the period, the equilibrium is exactly as the one described in the previous section. If the second period incumbent is a good government, he will choose $\mathbf{a}^G$ in the second period (or $\mathbf{a}^{Gc}$ if there is tax competition); if the second period incumbent is a Leviathan, he will choose $\mathbf{a}^B$ (resp. $\mathbf{a}^{Bc}$ if there is tax competition). Matters are different in the first period. At the end of the first period, the consumer will revise her beliefs about the type of the government on the basis of the observed choices in this period. Let $\eta(\theta, T, t, g)$ be the probability the consumer assigns to the incumbent government to be a good government at the end of the first period, as a function of her initial belief about the type of government (equal to the ex ante probability that the government is a Welfarist) and first period choices (T, t, g). Clearly, the best strategy for the consumer is to re-elect the incumbent if $\eta(\theta, T, t, g)$ is greater than θ, the ex ante probability

[7]For similar models where good governments also play strategically see Bordignon and Minelli (2001) and Coate and Morris (1995).

that the opponent is good, and it is to elect the opponent in the opposite case. That is, the citizen votes for the incumbent if $\eta(\theta, T, t, g) > \theta$; she votes for the opponent if $\eta(\theta, T, t, g) < \theta$. For simplicity, I also assume that the citizen votes for the incumbent when indifferent, that is when $\eta(\theta, T, t, g) = \theta$. This is effectively equivalent to rule out mixed strategies equilibria from this game[8].

To pin down the beliefs of voter outside the equilibrium path, note first that the assumption that the Welfarist government does not play strategically allow us to conclude that $\eta(\theta, T, t, g) = 0$ for $(T, t, g) \notin \mathbf{a}^G$ (or $(T, t, g) \notin \mathbf{a}^{Gc}$ if there is tax competition). If the voter observes in the first period choices that would never be possibly taken by the good government, she can only rationally conclude that these choices must come from a Leviathan government. In turn, this makes the options for the Leviathan government very simple in the first period. He might either try to mimic the good government, making choices that this government could also have taken in some cases in the first period and hoping that this will result in a re-election; or he may make some different choices, and in this case he knows for sure that he is going to be defeated at the election. In this last case, of course, the best thing for him to do is to go immediately for his preferred choices and set $\mathbf{a}^B$ (resp. $\mathbf{a}^{Bc}$ if there is tax competition) in the first period too.

What the Leviathan government actually does in the first period depends on the realization of the shock and on how much he discounts future. Suppose that the rate of discount of the bad government is $\delta < 1$, meaning that one unit of rent in the second period only counts for δ units of rents in the first period. Let us consider first the case without tax competition. Suppose first that the shock is negative. By the government's budget constraint, which is known to the voter, if the Leviathan wishes to mimic the good type, he cannot choose the tax rate and the public good independently (say, a high tax rate and a low public good) because otherwise the voter would immediately understand that he is accumulating rents and would punish him at the ensuing elections. Hence, if the shock is negative, the Leviathan can only choose either what the good government would do in this case (that is, $t = 0, T = T^*(\underline{\epsilon})$ and $g^*(\underline{\epsilon})$), or by exploiting his superior knowledge about the realization of the shock, he can pretend that the shock has been positive, and choose what the good government would do in this case (that is, $t = 0, T = T^*(\overline{\epsilon}), g^*(\overline{\epsilon})$). But it is easy to see that if the shock is negative both strategies are dominated for the Leviathan by the strategy of separating immediately and choosing $\mathbf{a}^B$ in the first period. In fact, if the Leviathan chooses $t = 0, T = T^*(\underline{\epsilon})$ and $g^*(\underline{\epsilon})$, his first period rents are zero, and even under the optimistic belief that he would then be re-elected for sure, he would be better off by deviating immediately, as future rents count less than present ones: $(1 + \widehat{t}L(\widehat{t}\ )) > \delta(1 + \widehat{t}L(\widehat{t}\ ))$. If instead he pretended that the shock has been positive, and taxed accordingly, his first period rents would actually be negative ($r = T^*(\overline{\epsilon}) - \frac{g^*(\overline{\epsilon})}{\underline{\epsilon}} = T^*(\overline{\epsilon})(1 - \frac{\overline{\epsilon}}{\underline{\epsilon}}) < 0$) and again he would be better by deviating immediately. Hence, if the shock is negative, the dominant choice for the Leviathan in the first period is to separate from the

[8] See again Bordignon and Minelli (2001) for a discussion of this issue.

good type, choosing his preferred choices immediately and losing the elections.

Matters are different if the shock is positive. If the Leviathan played the choices of the good type in this case, $T^*(\overline{\epsilon})$ and $g^*(\overline{\epsilon})$, his rents in the first period would of course again be zero. But if he pretended instead that the shock has been negative and chose $T^*(\underline{\epsilon})$ and $g^*(\underline{\epsilon})$ instead, he could earn positive rents: $T^*(\underline{\epsilon}) - \frac{g^*(\underline{\epsilon})}{\overline{\epsilon}} = T^*(\underline{\epsilon})(1 - \frac{\underline{\epsilon}}{\overline{\epsilon}}) > 0$. Notice that first period rents when mimicking are just a percentage of total tax revenue; to highlight this fact and to simplify notation, let us then write $T^*(\underline{\epsilon})(1 - \frac{\underline{\epsilon}}{\overline{\epsilon}}) \equiv \phi R(\underline{\epsilon})$ where $\phi \equiv \frac{(\overline{\epsilon}-\underline{\epsilon})}{\overline{\epsilon}}$ and $R(\underline{\epsilon})$ is just a reminder for total tax revenue when the shock is negative and there is no tax competition.

If he knew that he were elected for sure by playing this strategy, he would play it if $\phi R(\underline{\epsilon}) + \delta(1 + \widehat{t}L(\widehat{t})) \geq (1 + \widehat{t}L(\widehat{t}\ ))$ or if $\delta \geq (1 - \frac{\phi R(\underline{\epsilon})}{(1+\widehat{t}L(\widehat{t}))}) \equiv \delta^{*}$[9]. To know which would be his electoral possibilities if he played these strategies, consider then the voter's behavior. The rational voter would of course know that Leviathan governments are playing this strategy. In equilibrium, upon observing $\{t = 0, T = T^*(\underline{\epsilon}), g = g^*(\underline{\epsilon})\}$, by Bayes' rule, her ex-post beliefs about the type of government can be computed as:

(6) $\eta(\theta, T^*(\underline{\epsilon}), t = 0, g^*(\underline{\epsilon})) = \frac{\theta(1-q)}{\theta(1-q)+(1-\theta)q}$

The voter then votes for the incumbent if $\eta(\theta, T^*(\underline{\epsilon}), t = 0, g^*(\underline{\epsilon})) \geq \theta$; that is, if $\frac{1}{2} \geq q$, which in our case holds true by assumption.

Consider now the case with tax competition, so that the capital tax can at most be equal to β. It is easy to see that the previous argument would go through unchanged. It would still be true that if the shock is negative, the Leviathan government would prefer to separate immediately in the first period, and that if instead the shock is positive, by pretending that is negative, the Leviathan could earn positive rents in the first period by playing $\{t = t^{c*}(\underline{\epsilon}, \beta), T = \beta,\ g = g^{c*}(\underline{\epsilon}, \beta)\}$. The only difference is these first rents would now be given by $(\beta + t^{c*}(\underline{\epsilon}, \beta)L(t^{c*}(\underline{\epsilon}, \beta)))(1 - \frac{\underline{\epsilon}}{\overline{\epsilon}}) \equiv \phi R^c(\underline{\epsilon})$. Equation (6) would also remain unchanged, meaning that if the Leviathan plays $t = t^{c*}(\underline{\epsilon}, \beta), T = \beta,\ g = g^{c*}(\underline{\epsilon}, \beta)$ he knows that he is going to be re-elected for sure. Finally, the Leviathan would now find this strategy convenient if $(\phi R^c(\underline{\epsilon}) + \delta(\beta + \widehat{t}L(\widehat{t}\ )) \geq (\beta + \widehat{t}L(\widehat{t}\ ))$ or if $\delta \geq (1 - \frac{\phi R^c(\underline{\epsilon})}{(\beta+\widehat{t}L(\widehat{t}))}) \equiv \delta^{*c}$.

We can then sum up these results by stating:

Proposition 1 *"Suppose the economy lasts two periods and the good government only does what it is good for the voter in each period. If the shock is negative, then the only Bayesian Nash perfect equilibrium of the game is one where each type of government plays his preferred choices in each period, resulting in*

[9] Again, I assume that the Leviathan plays the mimicking strategy when indifferent to rule out mixed strategies. Bordignon and Minelli (.) and Besley and Smart (2007) also consider mixed strategies in related type of models.

the incumbent Leviathan to be defeated at the elections. If the shock is positive, providing that δ satisfies some conditions, then there exists a Bayesian perfect Nash equilibrium where the Leviathan government plays in the first period the corresponding strategies of the good type of government for the negative shock. At this pooling equilibrium, the Leviathan is re-elected for sure. These conditions are $\delta \geq \delta^*$ under no tax competition and $\delta \geq \delta^{*c}$ under tax competition, where $\delta^* = (1 - \frac{\phi R(\epsilon)}{(1+\hat{t}L(\hat{t}))})$ and $\delta^{*c} = (1 - \frac{\phi R^c(\epsilon)}{(\beta+\hat{t}L(\hat{t}))})$."

4 Yardstick competition

Hence, elections are not enough to tame Leviathans completely. Under the conditions stated in Proposition 1, Leviathan governments can still harm voters in the first period and be re-elected for sure in the second period. As argued in the Introduction, this is the point at which most economists would step in and advocate for more competition across governments. Tax competition clearly *does* make a difference to the electoral game: as we have already shown, in general, $\delta^* \neq \delta^{*c}$. But before discussing *how* tax competition affects the electoral game, let us consider first the second form of competition, yardstick competition. Can this help citizens?

To see this, suppose then that we now double the previous economy, forming a second economy exactly identical to the first. Perhaps, as argued in many studies in fiscal federalism, this could simply be the result of a decentralization process, where some functions originally performed by a single government, the central level, are now delegate to a number of local governments. Of course, for the consumer to be able to learn something about the type of her government by observing the choices made in the other jurisdictions, the two economies must be somehow related; for simplicity, I consider here the simplest case where the two economies are perfectly correlated, meaning that the realization of the productive shock at the first stage is the same in both economies[10]. I assume instead that the choices by nature of the type of government in the two economies are independently made.

The game evolves as follows. At stage zero of the first period, nature chooses both the realization of the shock (common to the two economies) and the types of governments in the two economies. Each government knows the realization of the shock and his type; he does not observe the type of the government chosen in the other jurisdiction[11]. At stage 2 of the first period, both governments independently and simultaneously selects the tax rates for their economy. Then citizens make their moves and tax revenue and public good supply are realized.

[10] Bordignon, Cerniglia and Revelli (2004) and Besley and Smart (2007) consider partial correlation.

[11] This is a bit far-fetched; presumably, a politician may know something more about the characteristics of a fellow politician than the common voter. But notice that unless this knowledge is perfect, our main results below would still go through.

Elections simultaneously take place in both economies. The second period is identical to the first, with the only difference that there are no elections at the end of this period. The game ends here.

As in the previous section, let us still suppose that welfarist governments do not play strategically. Which would be the behavior of the bad governments in the first period? Consider first the case without tax competition. By repeating the previous argument, it is easy to show that, by dominance, if the shock happens to be negative, the best choices for the two Leviathans would still be to grab as much as possible immediately and accept to be defeated at the ensuing elections. But if the shock is positive, the Leviathan can still earn the positive rents $\phi R(\underline{\epsilon})$ by pretending the shock has been negative [12]. If mimicking in this case is a convenient choice for the Leviathan, it depends again on the discount rate and the behavior of voters.

The posterior beliefs of the voters in jurisdiction i, η_i, are now a function of the choices observed in *both* economies: $\eta_i = \eta(\theta, T_i, t_i, g_i, T_j, t_j, g_j)$ $i, j = 1, 2$. At an equilibrium where both Leviathans are known to play the good type's negative shock choices when the shock is positive, these beliefs can be derived as follows. If the voter observes anything different from either $(t = 0, T^*(\overline{\epsilon}), g^*(\overline{\epsilon}))$ or $(t = 0, T^*(\underline{\epsilon}), g^*(\underline{\epsilon}))$ in her economy, she knows for sure that her incumbent is a bad type as the good type would never make these moves ($\eta_i = 0$). If she observes $(t = 0, T^*(\overline{\epsilon}), g^*(\overline{\epsilon}))$, she knows for sure that her incumbent is of the good type as the bad type would never make these choices (by dominance), and $\eta_i = 1$. If she observes $(t = 0, T^*(\underline{\epsilon}), g^*(\underline{\epsilon}))$ in her economy, but $(t = 0, T^*(\overline{\epsilon}), g^*(\overline{\epsilon}))$ abroad, she would immediately understand that her incumbent government is a Leviathan who is attempting to fool her ($\eta_i = 0$). If instead she observes $(t = 0, T^*(\underline{\epsilon}), g^*(\underline{\epsilon}))$ in both economies, her revised beliefs can be derived by Bayes' rule as follows:

(7) $\eta(\theta, (t = 0, T^*(\underline{\epsilon}), g^*(\underline{\epsilon}))(t = 0, T^*(\underline{\epsilon}), g^*(\underline{\epsilon}))) = \frac{\theta^2(1-q)}{\theta^2(1-q)+(1-\theta)^2 q}$

It follows that the voter would elect the incumbent in this case if $\theta \geq \frac{1}{2}$, which in our case holds true by assumption. Hence, the expected utility of the Leviathan by playing this strategy is $\phi R(\underline{\epsilon}) + (1 - \theta)\delta(1 + \widehat{t}L(\widehat{t}\ ))$; the Leviathan would then play this strategy, if this expected utility is larger than the utility of deviating immediately and collecting the maximal rents, that is if $\delta \geq \frac{\delta^*}{(1-\theta)}$.Repeating the same argument for the case of tax competition, it is immediate to see that everything would go through except that the condition for pooling would now become $\delta \geq \frac{\delta^{*c}}{(1-\theta)}$. We can then state:

[12] Notice that if we had allowed the tax base of capital to be a negative function of the tax rate, a Leviathan pretending to be hit by a negative shock may be further punished by tax competition. This is so because if the other government is a welfarist and chooses instead a lower capital tax (as would be normally the case if the shock is positive) the Leviathan would find himself with less rents in the first periods, as part of his capital would flow abroad. Predicting this, the Leviathan would be less willing to pool in the first period. We leave this extension to further research.

Proposition 2 *"Suppose there are two identical, perfectly correlated economies, with independently chosen types of governments. If the shock is positive, providing that δ satisfies some conditions, then there exists a Bayesian perfect Nash equilibrium where the Leviathan governments play in the first period the corresponding strategies of the good type for the negative shock. At this pooling equilibrium, the Leviathan is re-elected for sure, if the other government also happens to be Leviathan, and he is defeated otherwise. These conditions are* $\delta \geq \frac{\delta^*}{(1-\theta)}$ *under no tax competition and* $\delta \geq \frac{\delta^{*c}}{(1-\theta)}$ *under tax competition, where* $\delta^* = (1 - \frac{\phi R(\epsilon)}{(1+\hat{t}L(\hat{t}))})$ *and* $\delta^{*c} = (1 - \frac{\phi R^c(\epsilon)}{(\beta+\hat{t}L(\hat{t}))})$*"*

Comparing Proposition 1 with Proposition 2, we can immediately state:

Proposition 3 *There exists an interval of values for δ where pooling equilibria under yardstick behavior do not exist, while they exist in the model without yardstick competition. This interval is given by* $\delta \in \left(\delta^*, \frac{\delta^*}{(1-\theta)}\right)$ *without tax competition and by* $\delta \in \left(\delta^{*c}, \frac{\delta^{*c}}{(1-\theta)}\right)$ *with tax competition.*

Proposition 3 then illustrates the basic effect of yardstick competition; it allows citizens to better select between different types of governments[13]. By knowing that he will be found out with higher probability when cheating, the Leviathan prefers to deviate immediately in a larger number of cases, thus providing citizens with useful information for the ensuing elections. Observe that this information does not come freely. The Leviathan now exploits more fully the citizen in the first period than he would do if he had some chances of re-election; and since the future advantages for citizens are uncertain (they depend on the realization of the type of the elected opponent), it may well be that citizens end up by being worse off (even in expected terms) as a result of yardstick competition. These issues are discussed in greater details by Besley and Smart (2007), who emphasize the trade off between the *disciplining effect* and the *selection effect* of the electoral competition. I directly refer the reader to their paper for more discussion. I just limit myself here to note that is not entirely obvious that social welfare is the adequate normative criterion in this framework. Perhaps, in political matters, the issue of transparency in the quality of politics is so important to be paramount to considerations of social welfare, which would lead one to give more weight to the selection effect.

[13] Strictly speaking, this is not always true. Although the conditions on the discount rate for pooling are unambiguously more restrictive under yardstick competition than without it, the conditions deriving from Bayes' rule are more ambiguous. For instance, if contrary to our assumption we had $\theta > 1/2$, but $q < 1/2$, we could not have pooling as an equilibrium solution in pure strategies in the model without yardstick competition. But these results look rather implausible, at least when correlation across economies is perfect. See Bordignon, Cerniglia and Revelli (1994) for further details.

5 Yardstick versus tax competition

We are then finally ready to make our comparison. Unambiguously, at least in our (reasonable) model, yardstick competition works by helping the electoral screening process; that is, by providing more information to citizens on the quality of their governments, and therefore by enforcing more separation in the first period between different types of incumbents. Which are the effects of adding tax competition to this framework? To help clarify issues, let me propose the following definition:

Definition 4 *I say that tax competition and yardstick competition* reinforce *each other if the interval of parameters which support pooling equilibria in the first period further shrinks as an effect of introducing tax competition in the model; I say that tax competition and yardstick competition* interfere *one with the other in the opposite case.*

Referring back to Propositions 1 and 2, it is clear that these two cases can be assessed by simply comparing the conditions on the discount rate for supporting pooling equilibria in the two cases, with and without tax competition. That is,

Proposition 5 *Tax competition* interferes *with yardstick competition if $\delta^{*c} < \delta^{*}$; tax competition* reinforces *yardstick competition in the opposite case.*

That is, tax competition *interferes* with yardstick competition, or more generally (as can be seen by proposition 1), with the screening properties of the electoral process, if as a consequence of the increased capital mobility and reduced capital revenue, it increases the range of parameters which support pooling equilibria in the first period. Tax competition *reinforces* yardstick competition in the opposite case.

By recalling the expression for δ^{*c} and δ^{*}above, it is not a fortiori clear whether tax competition interferes or reinforces yardstick competition. On the one hand, tax competition reduces the rents that the Leviathan can earn by mimicking the good type in the first period and also reduces the rents that the Leviathan can earn in the second period if he manages to be re-elected. Both these forces push towards more separation in the first period. On the other hand, tax competition also reduces the rents that the Leviathan can grab in the first period if he decides to deviate and plays his favorite strategy. This force pushes toward more pooling in the first period.

To get a better intuition of these effects, let us then manipulate the formulas to get:

$$(8) \qquad \delta^{*c} < (>)\, \delta^{*} \qquad \text{if} \quad \widehat{t}L(\widehat{t}) \; < (>)\; \tfrac{g^{*c}(\beta)-\beta g^{*}(1)}{g^{*}(1)-g^{*c}(\beta)}$$

where in (8), for notational simplicity, I just dropped the dependence of $g\left(.\right)$ on ϵ as it is known that both levels of public expenditures are evaluated at $\epsilon = \underline{\epsilon}$. (The case with no tax competition is captured in (8) by writing $\beta = 1$ in $g(.)$). Equation (8) highlights a number of interesting features. First, any exogenous constraint on the maximal tax rate the Leviathan can raise, or on the minimum level of public good he has to offer, resulting in a lower maximum levels of rents (i.e. $\overline{r} < \widehat{t}\ L(\widehat{t}\ ) + 1$) and therefore in a fall of the RHS of (8), would certainly work towards *more pooling under tax competition*. That is, as anticipated above, our assumption of an untamed Leviathan is the one which works mostly in favour of greater separation as a result of tax competition. Second, the numerator on the expression on the RHS is certainly non negative. To see this, just note that $g^{*c}(\beta) > \underline{\epsilon}\beta$, $g^{*}(1) = \underline{\epsilon}T^{*}$ and $\underline{\epsilon}\beta - \underline{\epsilon}\beta T^{*} \geq 0$ as $T^{*} \leq 1$. Third, the denominator is also certainly not negative as $g^{*}(1) \geq g^{*c}(\beta)$. It follows that both elements in the two sides of (8) are certainly positive.

Intuitively, there are two main forces at play in determining which of the two sides of (8) is the greatest. The first hinges on the importance of public expenditure for voters. If voters value the public good very highly, so much that in spite of having to use a distorting tax to finance public expenditure under tax competition, the Welfarist government would still attempt not to reduce too much public good supply, so that $g^{*}(1)$ is not too far from $g^{*c}(\beta)$, then the expression on the RHS of (8) would become very large, pushing toward more pooling under tax competition. The reason is simple. If $g^{*}(1)$ is not very far from $g^{*c}(\beta)$, the rents that the Leviathan government can accumulate when pooling in the first period do not fall very much under tax competition (since these rents are proportional to revenue and therefore to public expenditure). Hence, since the rents that he can grab by separating unambiguously instead fall under tax competition, the Leviathan government is led to pool more in the first period.

The second force hinges on the elasticity of the labor tax base. If this elasticity is very high, $g^{*c}(\beta)$ will be much smaller than $g^{*}(1)$, rents when pooling in the first period for the Leviathan will fall a great deal, and the expression on the RHS will tend to become smaller. This will push toward more separation in the first period. But notice that the effect of a high elasticity of the tax base it is not so simple. If the elasticity of the labor tax is very high, the expression on LHS of (8) (tax revenue at the apex of the Laffer's curve) will also fall, pushing toward more and not less pooling in the first period.

To see these effects more precisely, consider an infinitesimal relaxing in tax competition, which we could capture as an infinitesimal increase in β. To ease notation and without loss of generality suppose $\underline{\epsilon} = 1$ in what follows. Differentiating equation (3) (which would hold as an equality under tax competition) with respect to β, and using a first order approximation, we can then write:

(9) $g^{*} - g^{*c} \approx \frac{g^{*c}\widetilde{\sigma}_t}{\mu L(t)(1-\widetilde{\sigma}) + g^{*c}\widetilde{\sigma}_t}\left(T^{*} - \beta\right)$

where the first expression on the RHS of (9) is evaluated at the optimal tax choices for the Welfarist government under tax competition and $\epsilon = \underline{\epsilon} = 1$.

The two forces discussed above are clearly represented in this formula. The ratio on the RHS of (9) is between zero and one. If $\widetilde{\sigma}_t$ is very small and/or μ (the elasticity of marginal utility) is very large, the RHS of (9) will tend to zero, meaning from (8) that tax competition will certainly induce more pooling behavior. On the other hand, if the tax base is very elastic (meaning that the elasticity of the tax base increases very quickly as t increases), the RHS of (9) will tend to one, and the RHS of (8) will tend to its minimal value $\frac{\beta(1-T^*)}{T^*-\beta}$. However, in this case, the LHS of (8) will also fall, making the total effect generally ambiguous. Getting general results from (8) is difficult. To gain further insights, in the next session, we recur to some examples and some simulations.

6 Simulations

An analytical example.

Let us first suppose that $\mu = 1$ (e.g. $H(g) = \log(g)$). Than $g^* = T^* = 1$ and $g^{*c} = (1 - \widetilde{\sigma})$. Suppose further that $\widetilde{\sigma}_t = k > 0$ so that $\widetilde{\sigma} = kt$. Equation (9) can then be rewritten as $g^* - g^{*c} = kt^* = \frac{k}{L(t^*)+k}(1-\beta)$ which implies $(1 - kt^*) = t^*L(t^*) + \beta$ by the government's budget constraint. Notice that this last expression can also be rewritten as $(1-\beta) = t^*(L(t^*) + k)$. In turn, under the above hypotheses, the RHS of (8) can be rewritten as $\frac{1-kt^*-\beta}{kt^*}$; substituting from the previous expression, we get that the RHS of (8) reduces to $\frac{L(t^*)}{k}$. Consider now the LHS of (8). $\widehat{t}$ is implicitly defined by the condition $1 = \widetilde{\sigma}(\widehat{t})$, or $\widehat{t} = \frac{1}{k}$. Substituting in equation (8), we then get $L(\widehat{t}) < L(t^*)$ as $\widehat{t} > t^*$, implying $\delta^{*c} < \delta^*$.

A second example with simulations.

Let us now consider a second example, which allows for more variations in the fundamental parameters. Let us suppose the citizen's utility function takes the form $u = c + \frac{1}{1+\mu}g^{1+\mu} - \frac{\sigma}{1+\sigma}l^{\frac{1+\sigma}{\sigma}}$, with $\mu < 0$, and where the absolute value of μ is the (constant) elasticity of the marginal utility of the public good, as defined above, and σ is the (constant) net of tax wage elasticity of labor supply (see note 3). With such an explicit functional form, one can derive the optimal solutions in the different cases and directly compute the two sides of (8). In particular, $L(t) = (1-t)^\sigma$ and $\widehat{t} = \frac{1}{1+\sigma}$, so that $\widehat{t}L(\widehat{t}) = \frac{1}{1+\sigma}(\frac{\sigma}{1+\sigma})^\sigma$. Assuming $\underline{\epsilon} = 1$,it also follows that $g^*(1) = 1$, so that T^* is also equal to 1. $g^*(\beta)$ can be directly computed from (3) as a function of $\{\beta, \mu, \sigma\}$. I computed (8), by running several simulations (around 500) for different values of $\{\beta, \mu, \sigma\}$ in the range $0.1 \leq \beta \leq 0.9$, $0.1 \leq \mu \leq 2$ and $0.1 \leq \sigma \leq 2$[14]. The table below presents a sample of the results [15].

[14] I wish to thank Umberto Galmarini for his assistance in running these simulations.

[15] The complete set of simulations is available from the author on request.

Table 1. Computing (8) for different values of $\{\beta, \mu, \sigma\}$.
In the table *lhs* and *rhs* indicate, respectively, the LHS and the RHS of (8)

μ	β	σ	$\widehat{t}$	g^*	lhs	rhs	β	σ	$\widehat{t}$	g^*	lhs	rhs
2	0.1	0.2	0.83	0.66	**0.58**	**1.68**	0.9	0.2	0.83	0.99	**0.58**	**8.87**
1	0.1	0.2	0.83	0.63	**0.58**	**1.41**	0.9	0.2	0.83	0.98	**0.58**	**4.5**
0.5	0.1	0.2	0.83	0.57	**0.58**	**1.1**	0.9	0.2	0.83	0.97	**0.58**	**2.3**
0.1	0.1	0.2	0.83	0.39	**0.58**	**0.47**	0.9	0.2	0.83	0.93	**0.58**	**0.49**
2	0.1	2	0.33	0.25	**0.15**	**0.20**	0.9	2	0.33	0.95	**0.15**	**0.83**
1	0.1	2	0.33	0.24	**0.15**	**0.19**	0.9	2	0.33	0.93	**0.15**	**0.45**
0.5	0.1	2	0.33	0.23	**0.15**	**0.17**	0.9	2	0.33	0.92	**0.15**	**0.24**
0.1	0.1	2	0.33	0.17	**0.15**	**0.08**	0.9	2	0.33	0.90	**0.15**	**0.05**

Values computed for $\underline{\epsilon} = 1$,implying $T^* = g^*(1) = 1$.

The picture which emerges from the Table, and more generally from the entire set of the simulations, is quite clear. The key parameter, as suggested by our discussion above, is μ, the elasticity of the marginal utility of the public good (or the reciprocal of the price elasticity of the demand for the public good). For $0.4 \leq \mu$, that is, when the demand for the public good is not too elastic (less than 2.5), the RHS of (8) is always larger than the LHS, irrespective of the values set for the other parameters, implying that tax competition *interferes* with yardstick competition. When $0.1 < \mu \leq 0.3$, we get mixed cases, with the LHS which tends to become larger than the RHS, the more wage elastic is labor supply (e.g. the higher is σ) and the stronger is the effect of tax competition on capital flights (that is, the smaller is β). Finally, for an extremely elastic demand for the public good, $\mu = 0.1$, (implying a price elasticity of 10 for the demand of the public good) it is almost always the case that the RHS of (8) is smaller than the LHS, meaning that tax competition *reinforces* yardstick competition.

Summing up, the results of these exercises clearly point toward a tendency for tax competition to lead to more pooling in the first period, so interfering with yardstick competition and more generally with the screening properties of the electoral process. In the simulations above, it is only for an implausibly high elasticity of the demand for the public good that yardstick competition and tax competition can work in the same direction, by increasing separation among types. Otherwise, the opposite is true and the two different forms of competition among governments tend to work one against the other. Perhaps, the simplest way to understand our results is the following. As argued by Besley and Smart (2007), elections have both a disciplining effects –forcing governments to behave more in the interests of voters– and a selection effect –allowing citizens to discriminate between good and bad governments. Tax competition and yardstick competition affect this trade off in opposite directions. Tax competition, by reducing the resources a bad government can expropriate, clearly works in the direction of strenghtening the disciplining effect of the electoral process. Yardstick competition, by enlarging the information set of voters, works by reinforcing the selection effect of the electoral process. Putting them together, it is then not too surprising that the two forms of government competition tend to interfere one with the other.

7 Coming at terms with Besley and Smart (2007)

Our conclusions here may look surprising in the light of Besley and Smart's results, which seem to point out to a different relationship between tax competition and political equilibria[16]. In particular, in section 4 of their paper, they clearly state that "increasing inefficiencies in the tax system can lead to a move from a pooling to a separating equilibrium" (Besley and Smart, 2007:763), where in their view increasing "inefficiencies in the tax system" may also be the result of "an intensification of tax competition". On the contrary, all our results here are drawn by the fact, as shown in our proposition 1, that in general, unless μ is very small, tax competition leads to more pooling equilibria. But these apparently contrasting results are easily explained by considering the differences in the modelling choices. Besley and Smart are not interested in tax competition as such and therefore do not model explicitly, as I do here, the effect of tax competition on tax revenue. In their model, the utility of voter is simply written (in their notation) as $W = G - \mu C(x)$, where W is the utility of voters, G is public goods, x is tax revenue, $C(.)$ is an increasing strictly convex function, and μ is the marginal cost of public funds. Thus, when they study the effects of introducing, or increasing, tax competition on the equilibria of their model, they do it by just raising μ, the marginal cost of public funds, a change which according to the two authors may also capture several other possible factors (a technological change in the ability to collect taxes, the passage of a constitutional restriction on the tax base, a citizen's initiative which restricts the use of specific tax instruments etc., see Besley and Smart (2007: 762)). But in this search of generality, they fail to recognize that tax competition, differently from some of the other possible factors which may also affect the marginal cost of public funds, in general also influence the resources that a Leviathan can grab when separating. Specifically, while in our model the maximum resources a Leviathan can expropriate under tax competition are given by $\beta + \widehat{t}L(\widehat{t}\ )$, and so clearly depend on the force of tax competition (which reduces β, the capital tax base), in Besley and Smart these resources are fixed and given by an exogenous value, X. This explains their result. As in our model, tax competition reduces the rents that a Leviathan can appropriate when mimicking the good government (which in our model falls from $\phi R(\underline{\epsilon})$ to $\phi R^c(\underline{\epsilon})$; see section 4); but, differently from our model, where tax competition also reduce the maximal rents from separating, in their case these rents are fixed, which obviously pushes toward more separation as a result of tax competition.

[16] In a section of their paper, Besley and Smart (2007) also briefly discuss of yardstick competition. But they do so by ruling out by assumption separating equilibria, which makes it difficult to compare their results with mine. Moreover they never explicitely compare the effects of yardstick and tax competition, which is our main point here.

Thus, the difference in the results is a consequence of the difference in the modelling assumptions. The question is then which modelling assumption is more convincing for the problem at hand. To me, it just seems implausible to assume that the maximal rents a Leviathan can grab are independent of the extent of tax competition. Indeed, all the thrust of the Public Choice School 's argument for supporting tax competition as a way to discipline governments, is based on the idea that tax competition reduces the ability of bad governments to expropriate citizens. So, it is unclear to me how one could examine this argument by assuming it away.

8 Concluding remarks

Elections are the main way used in democracies to discipline governments. Economists argue that competition among governments may also play a useful role. But governmental competition can take two forms; either through tax competition or through yardstick competition. In this paper, I develop a simple model which allows me to study the effects on political equilibria of both forms of governmental competition. The paper shows that, and makes clear why, the two forms of competition may, and in general do, conflict one with other. Tax competition reduces the rents a Leviathan can expropriate, but as an effect, generally supports more political equilibria where the citizen is unable to distinguish between good and bad politicians. Yardstick competition allows citizens to better distinguish the quality of the incumbent governments and so to better select between the politicians, but in order to work it requires that different politicians may make different choices. When both forms of competition are present, they tend to interfere one with the other; the screening properties of yardstick competition are reduced when tax competition is also present, as tax competition forces politicians of different qualities to make more often similar choices. It follows that it is in general unjustified to advocate for both forms of governmental competition at the same time, as it is routinely made in the fiscal federalism literature.

This paper calls for several improvements. In particular, to keep the analysis manageable, tax competition has been here introduced in a very simple way, without allowing for strategic interactions between jurisdictions in the setting up of the taxes on capital. A more fully fledged model, which explicitly discussed the strategic tax choices of the different types of incumbent and their effects on the political equilibria, would be highly recommended and could increase our understanding of these interesting issues.

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