Can Tax Competition Lead to a Race to the Bottom in Europe? A Skeptical View

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March 2006

MIDDLEBURY COLLEGE ECONOMICS DISCUSSION PAPER NO. 06-04

DEPARTMENT OF ECONOMICS
MIDDLEBURY COLLEGE
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http://www.middlebury.edu/~econ

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Abstract: This paper addresses the question of the likelihood of a race to the bottom in a monetary union, like the Euro-zone, that could result from tax competition between countries. This fear of a race to the bottom is used both in the economic literature and the political arena to promote tax harmonization. Using a game theoretical approach with the costs of changing tax policies to analyze the conditions of a race to the bottom, this paper shows that countries may not choose such an extreme strategy. In other words, the extreme case scenario of a race to the bottom is unlikely, and proponents of tax harmonization should base their reasoning upon other assumptions.

Keywords: Monetary union, Economic integration, Tax competition, Tax harmonization, Fiscal competition

JEL classification: H20, H26, H77, H87

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Abstract: This paper addresses the question of the likelihood of a race to the bottom in a monetary union, like the Euro-zone, that could result from tax competition between countries. This fear of a race to the bottom is used both in the economic literature and the political arena to promote tax harmonization. Using a game theoretical approach with the costs of changing tax policies to analyze the conditions of a race to the bottom, this paper shows that countries may not choose such an extreme strategy. In other words, the extreme case scenario of a race to the bottom is unlikely, and proponents of tax harmonization should base their reasoning upon other assumptions.

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1. Introduction

This paper addresses the question of tax competition in Europe from a non-normative standpoint. While most of the existing work adopts a non-cooperative approach, the choice is made here to consider a cooperative game with prior commitments in order to

capture the tacit coordination, or at least the sharing of signals, that occur in many European instances. From a theoretical perspective, the cooperative approach complements previous approaches based on non-cooperative game theory. From a practical perspective, it helps capture the importance of initial conditions, for instance rigidities in political decision making or taxation policies.

One example of a European institution in which some coordination occurs is the Eco-Fin, where Finance ministers meet, exchange information, and make "soft" agreements about their respective policies. Yet this is not a real coordination mechanism insofar as there are no binding agreements and ministers can change their policies as soon as they are back in their respective countries. Prior commitments that may occur in such institutions can only be partial and are considered as such in our model.

Over the years, the European Commission, and more generally European Institutions, have recommended a coordinated action against tax competition in Europe. The objective of such coordination is reducing distortions still existent within the single market, while also avoiding losses in tax receipts—that is to avoid a "race to the bottom". Some practical steps have been taken in that respect:

1. The Eco-Fin Council of December 1, 1997 gave its assent to a code of conduct in the field of companies' taxation.
2. In June 2000, the European Council finally agreed to a compromise with respect to taxes on savings, whereby European countries have to inform other countries about savings made by residents from other member states. Yet, a transition period of 7 years was established during which a minimum common tax rate of 15% until 2004, then 20% until the end of 2009, applies.

3. To avoid growing differences between the Value-Added Tax (VAT) standard rates between Member States, supposedly leading to structural imbalances in the EU, and distortions of competition in some sectors, it has been agreed that, until 31 December 2005, the standard rate must remain above 15% (Directive 2001/41/CE of 19.01.2001 – OJ L 22, 24.1.2001). The European Commission has also presented a proposal relating to the scope of reduced rates in order to simplify the rules in this area, and to achieve a more uniform application of the tax. The objective is to give Member States equal opportunities to apply reduced rates in some sectors (e.g., restaurants, housing, gas and electricity and home care services), and is also intended to rationalize the many VAT rate derogations currently available to individual Member States.

The danger of a possible race to the bottom that could result from tax competition between countries is one of the main reasons why tax harmonization in Europe is often advocated. In such a case, countries would not likely end up with a zero tax rate, but with "too low" a tax rate. The main consequence of such a tax rate may be the un-sustainability of public spending that could push countries into some financial turmoil.

Hence, the recommendation at both the European Union (EU) institutional level and in the economic literature is for some harmonization of national tax policies (Razin and Sadka, 1991), or some form of coordination of tax policy between national authorities (Frenkel, et al., 1991, Persson and Tabellini, 1995, Rodrik and van Ypersele, 2001, Turnovsky, 1997).

A very illustrative paper from Mendoza and Tesar (2005) tries to tackle this type of issue in a new way. Yet the authors do not address directly the question about "why" there may

or may not be a race to the bottom. Their panel data analysis addresses the following question: can a race to the bottom be the outcome of tax competition? Their findings suggest that firstly, there is no evidence of a race to the bottom, and secondly, "countries with relatively inefficient tax systems can experience significant welfare losses if, as a byproduct of financial integration, they find themselves competing over capital income taxes against countries with relatively efficient tax systems. (…) Harmonization of taxation on immobile factors, and freedom to adjust consumption taxes to make up for the tax revenue lost to capital income tax competition would be far more desirable."

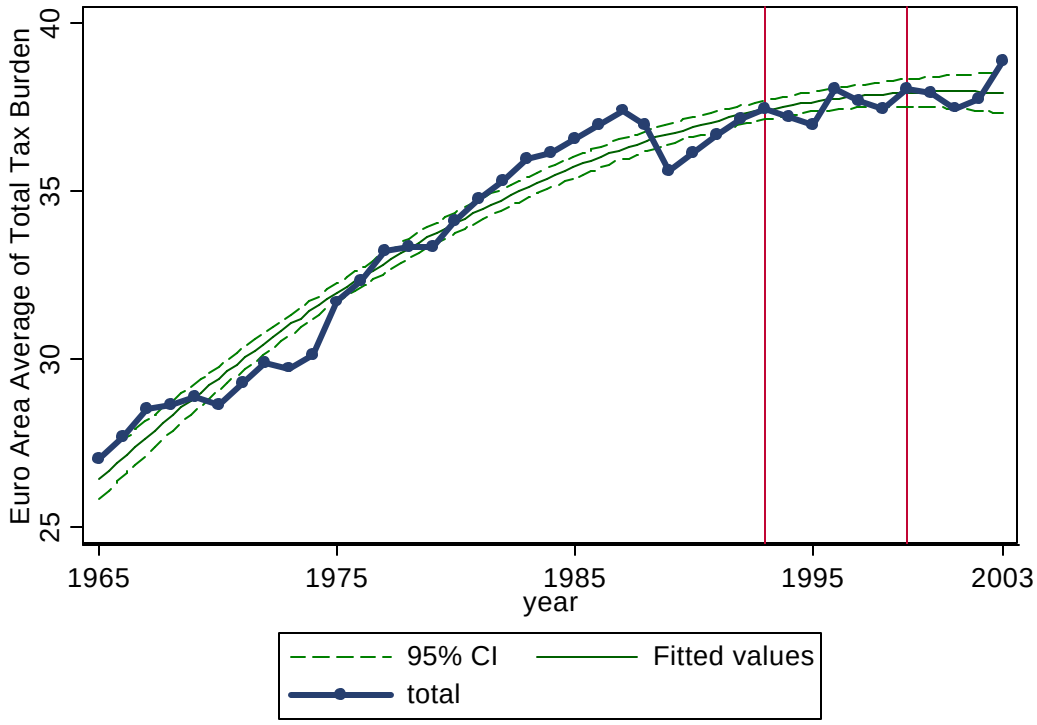
A race to the bottom in public finance is a good illustration of the cobweb model in microeconomics: a slight deviation from the initial equilibrium leads to an explosive situation with no return to the equilibrium. There is no way to know *ex ante* whether the deviation is temporary or looks like an unstable cobweb. Tax competition in Europe does not seem to have pushed countries into an unstable cobweb pattern, although we can observe changes in taxation policies.

Before presenting our model, it is necessary to examine the most important facts about taxation in Europe. If a race to the bottom had happened, the total tax burden of the Euro area as a whole, or at least for some countries, might have decreased. The evolution of taxes on mobile and immobile assets may also reflect international competition.

Based on the OECD Revenue Statistics database (2004), the total tax burden in % GDP for the whole Euro area and per country is presented respectively in Figure 1 and Figure 2. The total tax burden is the sum of taxes on corporate income, personal income, consumption, property, and social security contributions. Quadratic fitted curves with a 95% confidence interval are also presented in order to extract the trend from the data.

For the Euro area (Figure 1), the trend of the total tax burden has been increasing from 1965 to about the end of the 1990s. Since then, it has been relatively stable (with an increase in the current tax burden in 2002). At the beginning of the 21st century the *level* of the total tax burden as a % of GDP is about 10 points higher than the middle of the 1960s.

Figure 1. Euro average of total tax burden as a % of GDP.

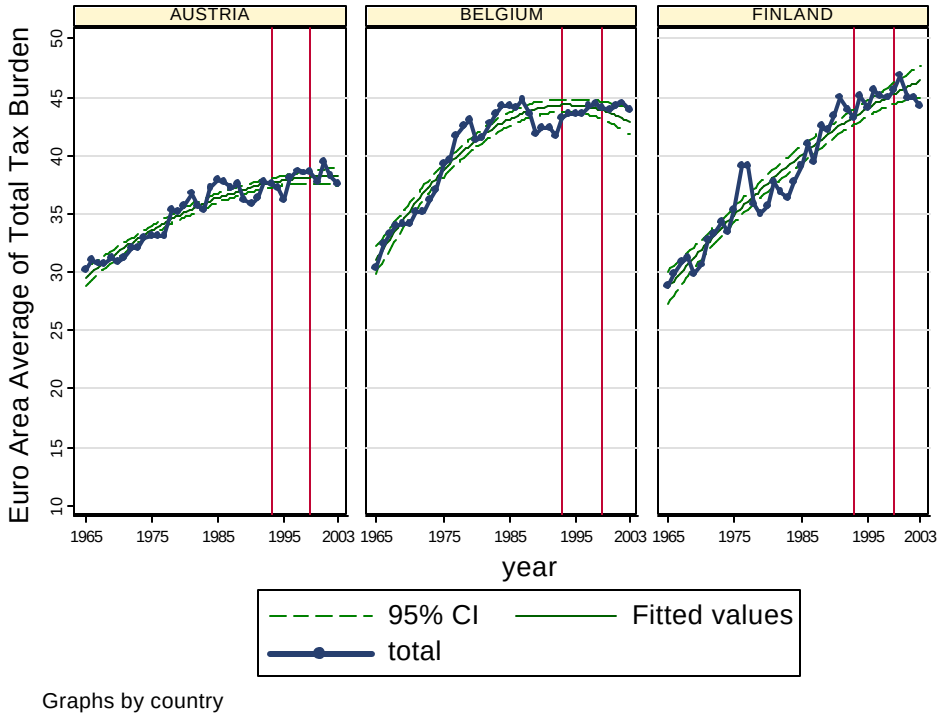


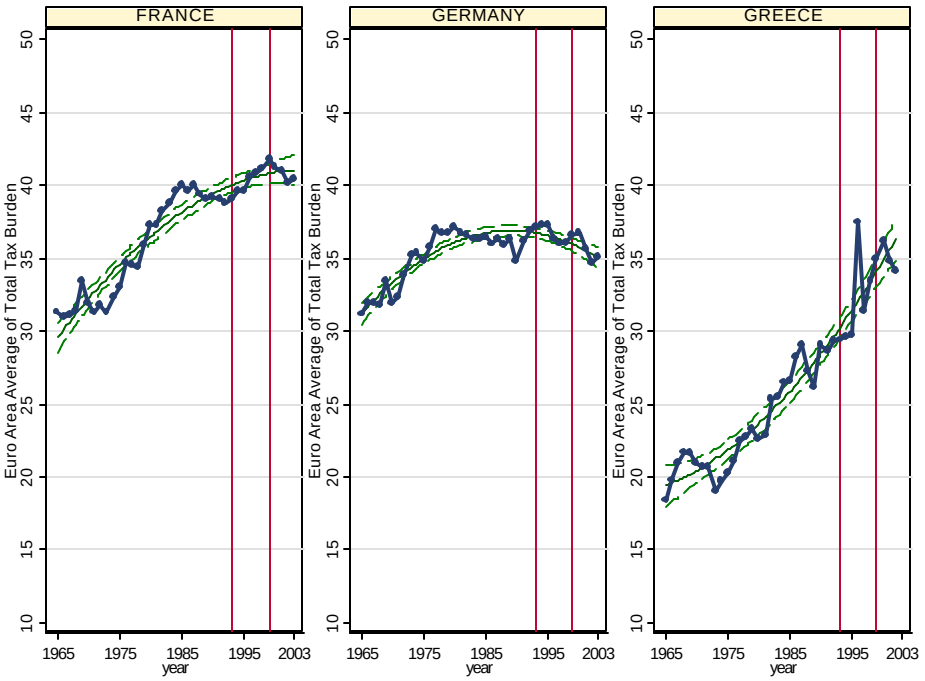
Source: OECD (2004) and own calculations.

The red vertical lines represent the beginning of the official economic convergence period (1993) and the introduction of the Euro (1999). As far as the various member states are concerned (Figure 2), the total tax burden has increased almost continuously

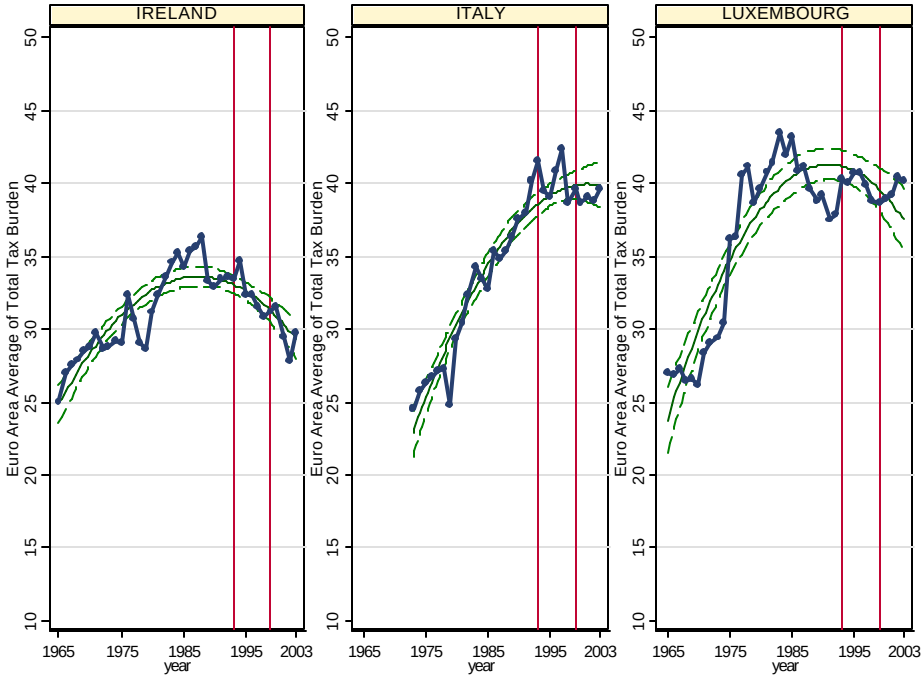
from 1965 to 2003 for all countries, (except for The Netherlands and Ireland,) and to a lesser extent for Luxembourg, Italy, Germany, and France. (For Germany and France the decreases have been recent developments). The decreases in Ireland and the Netherlands are quite significant from about the second part of the 1980s to the beginning of the 2000s. Noticeably, the trend for Greece captured by the quadratic fitted curve is the only one with a convex shape, indicating acceleration in the growth rate of the total tax burden.

Figure 2. Total tax burden as % of GDP.

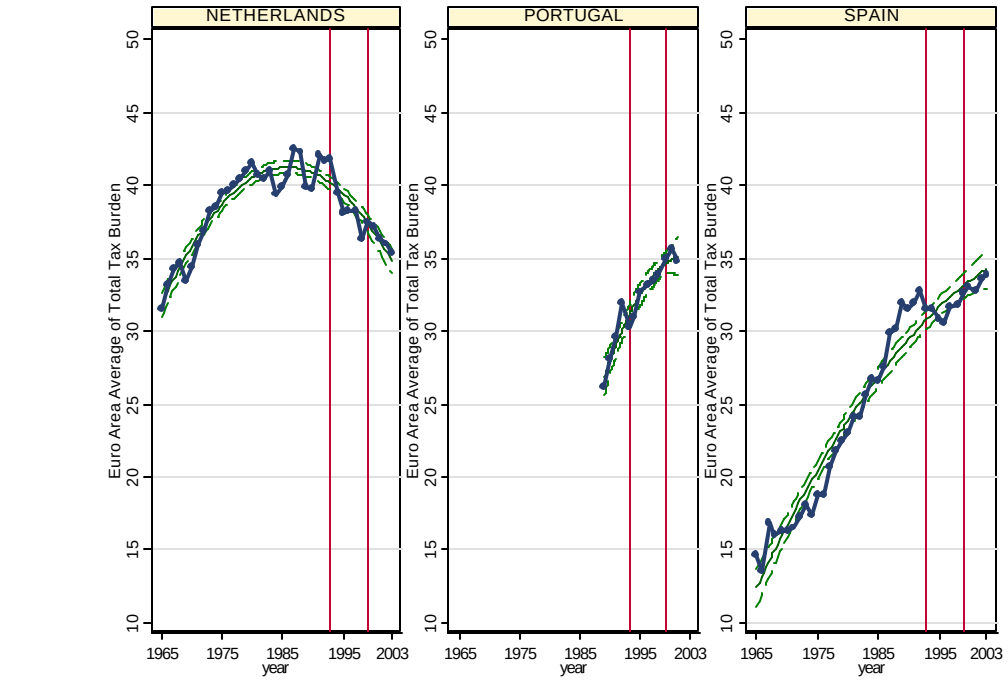




Graphs by country



Graphs by country

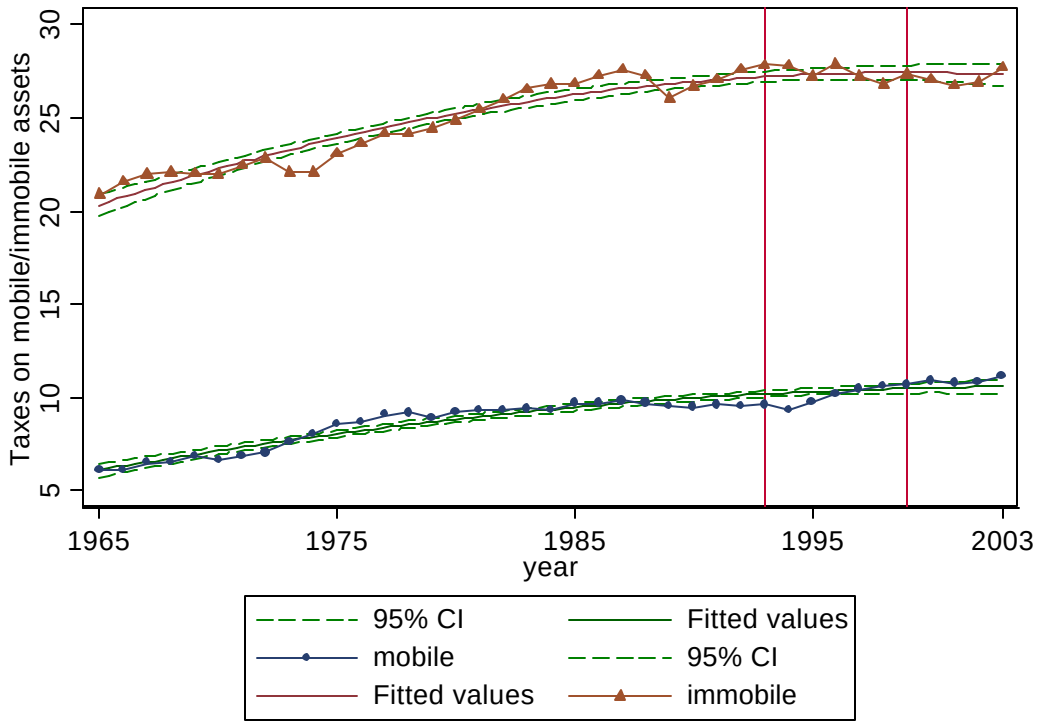


Source: OECD (2004) and own calculations.

Taxes on mobile and immobile assets are differentiated following Benassy-Quere, et al. (2000). Taxes on immobile assets are measured by the sum of personal income tax, social contributions of employees, consumption tax, and property tax. Taxes on mobile assets are the sum of corporate income tax and social contributions by employers.

Taxes on immobile assets for the Euro area as a whole (Figure 3), have increased from 1965 until the middle of the 1990s, and have started decreasing since then. Taxes on mobile assets (Figure 3) have also increased until the late 1980's, remained relatively steady until the first half of the 1990s, and increased slightly again until 2003. Most importantly, there is no evidence for the Euro average of a substitution of taxes on immobile assets for taxes on mobile assets; such a substitution could have been a sign of a race to the bottom due to tax competition on mobile assets.

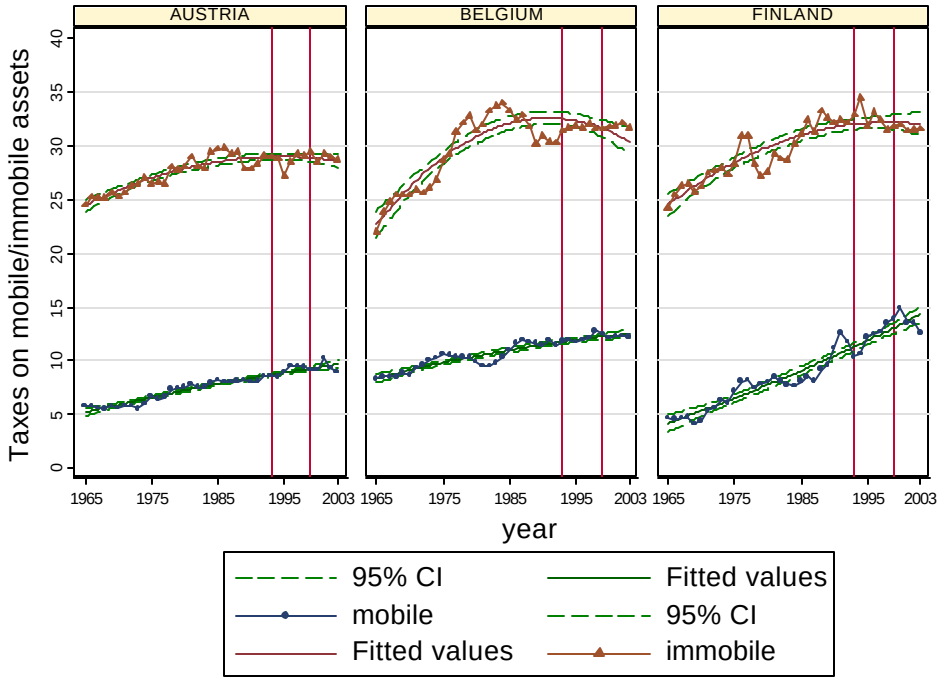
Figure 3. Euro Area Average of Taxes on Mobile/Immobile Assets as % of GDP.



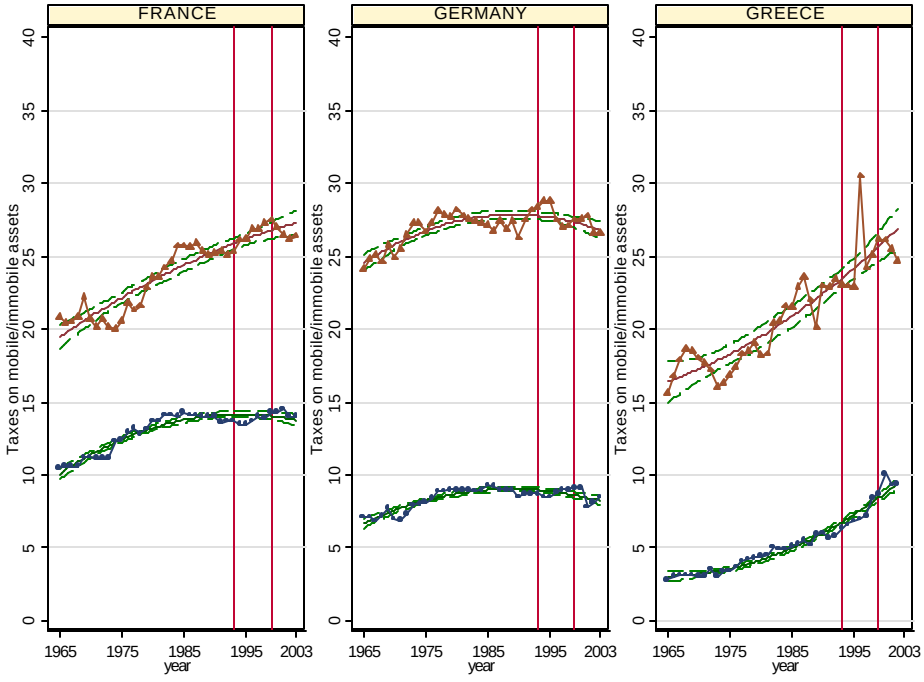
Source: OECD (2004) and own calculations.

Yet, even without this substitution for the Euro area as a whole, there may exist substitution for some specific countries. Figure 4 (mobile and immobile taxes for each member state) shows that such an event did not happen.

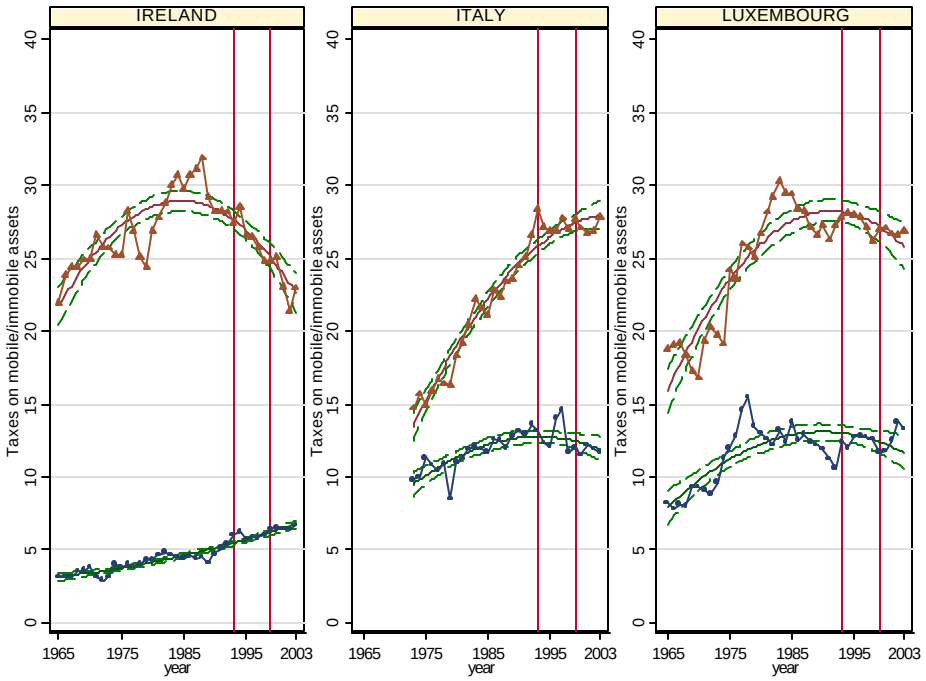
Figure 4. Euro Area Average of Taxes on Mobile/Immobile Assets as % of GDP.



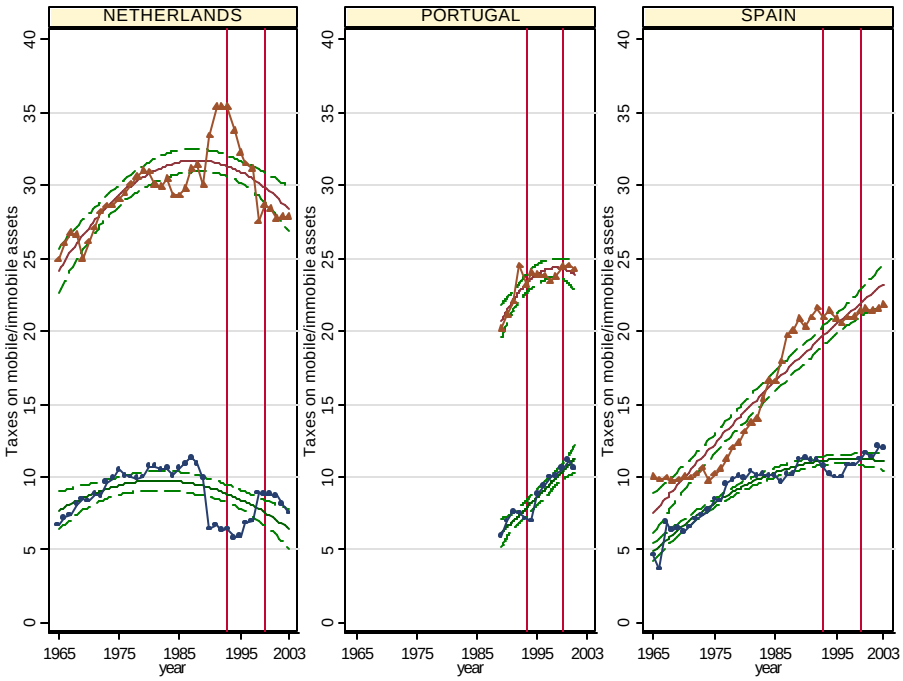
Graphs by country



Graphs by country



Graphs by country



Graphs by country

Source: OECD (2004) and own calculations.

It would appear, on the contrary, that both components have a tendency to move in the same direction, not in opposite directions as substitution would imply. The exception is that for very short periods of time (for example, The Netherlands by the end of the 1990s,) a *decrease* in the immobile tax burden was associated with an *increase* in the mobile part, the reverse of what could be expected from a race to the bottom![1]

When one looks at the fitted values curves and their concavity/convexity in figure 4, two countries show evidence of a substitution effect from taxes on immobile assets to taxes on mobile assets: Finland and Ireland. The evidence is even more noticeable for Ireland.

These data suggest that a race to the bottom did not really exist during the period under consideration. Yet, the same facts do not guarantee that a race to the bottom may not happen in the future, especially with the higher integration that the European monetary Union (EMU) seeks to create over time. How can we analyze this possibility?

In addition to existing econometric papers on the topic (for instance Devereux, et al., 2002), a game theoretical approach is a useful way to deal with the question. Conceptually, a race to the bottom game is related to a potential future result. In other words, one cannot, *ex ante,* decide whether a race to the bottom is in the process of occurring, or similarly, that a race to the bottom might occur, even though taxes might be decreasing. One cannot discard the possibility either. What must be considered is the likelihood of such a critical game to the bottom. By nature, a race to the bottom is a

[1] About the same observation can be made about Ireland from 1988 onwards, in spite of a diminution of the corporate tax rate by 1998. In Ireland, in 1998, manufacturing companies have in general been eligible to a lower corporate tax rate: 10% from 1998 to January 1, 2003, and 12.5% since then, even if the normal corporate tax rate remained at 40%. For eligible companies, the 12.5% rate is maintained until the year 2010. Yet, as shown later, this change in policy does not appear to explain the decrease in the total tax burden.

theoretical assumption; it is an extreme scenario, whose final outcome is the countries' insolvency (Lopez, et al., 1996), i.e., countries cannot raise enough revenue to pay for their public expenditure. Game theory is a good method to deal with such a situation. It is also a good method to deal with political decisions made by governments, be they taken in coordination with other countries or not,, that may trigger a race to the bottom. As in Wildasin (2001) this is done *via* the modeling of countries' interaction. This explains why this paper proposes a cooperative game to answer this question. In other words, a game theoretical model is a good *theoretical* answer to the *theoretical* assumption of a war of attrition.

Within this framework we cam answer whether a race to the bottom through tax competition is possible,and under what conditions such a race would occur?

The model illustrates a race to the bottom game with a bargaining situation and costs of changing tax policies. No uncertainty exists in terms of tax policies implemented. The analysis is designed to explore the role of commitment tactics on the outcome of a bargaining process between two governments.

After this introduction (Section 1), Section 2 presents and analyses the model. Section 3 concludes and sets forth some policy implications based upon our findings.

2. The model

2.1 The hypotheses

The model of this paper is a bargaining game with possibilities of a race to the bottom. The bargaining process is used as a proxy to capture, in a theoretical way, tax competition in practice.

In many bargaining situations, the countries involved often take actions prior to, and/or during the negotiation process, that partially commit themselves to some strategically chosen bargaining positions. Such commitments are still considered partial in the sense that they are revocable. But revoking a partial commitment can be costly. If this cost is higher than the cost of implementing an agreed rule, a country prefers to respect the rule than the reverse, and *vice versa*.

The main objective of our analysis is to investigate the role of such commitment tactics on the bargaining outcome within a tax competition framework. The following hypotheses are made:

Firstly, each country knows the other's costs of revoking its commitment. Partly, as a result of this assumption, the unique equilibrium is always Pareto efficient. In particular, in equilibrium, the countries involved do not make incompatible partial commitments.

Secondly, the model is a two-stage game. In the first stage, the two countries choose their respective partial commitments. This can be interpreted as taking place outside the formal negotiating process. After such partial commitments become known, the countries enter the formal negotiating process in the second stage, and try to reach agreement.

Lastly, innovation and/or the creation of new companies does not occur in either countries. We focus on an existing pool of companies that can move from one country to another. The goal is to concentrate on the policy changes that can create distortions compared with the initial period.

The model is as an extension to Rubinstein's model (Rubinstein, 1982), in which the bargainers make partial commitments before engaging in the offer-counteroffer process.[2] The version presented here is inspired by the interpretation of Rubinstein's model by Muthoo (1999), and is explicitly built upon a Nash's bargaining solution. A main focus of interest is the nature of the equilibrium in the first stage – the negotiation stage, where partial commitments are strategically chosen. In the tax competition versus harmonization case, an important issue to study is the circumstances under which, in equilibrium, countries make incompatible partial commitments. Hence, although the equilibrium at the first stage is influenced by the second stage game, first stage equilibrium actions are the focus of interest.

2.2 The players

Two countries, A and B, bargain over how to share a pool of companies, denoted S (where $S > 0$).

They simultaneously and independently choose numbers from the closed interval $[0, S]$.

Let c_i denote the number chosen by country i ($i = A, B$) that would comply with the fiscal objectives of this country. The interpretation is that country i takes "actions"

[2] It should be noted that this model is one example of the framework of two-stage games of ``claims' and ``concessions".

which *partially* commit it to not accept a share strictly less than c_i. A partial commitment can later be revoked at some cost to the country.

The utility $U_i(s_i, c_i)$ of country i from obtaining a percentage share $s_i \in [0, S]$ of the pool of companies, given that the country partially committed itself to $c_i \in [0, S]$ (in percent), is:

$$U_i(s_i, c_i) = s_i - C_i(s_i, c_i), \tag{1}$$

where $C_i(s_i, c_i)$ denotes the cost to country i of revoking its partial commitment c_i and obtaining a share s_i.

It is assumed that $C_i(s_i, c_i)$ if $s_i \geq c_i$, and that $C_i(s_i, c_i) > 0$ if $s_i < c_i$.

More specifically:

$$C_i(s_i, c_i) = \begin{cases} 0 & \text{if } s_i \geq c_i \\ a(c_i - s_i) & \text{if } s_i < c_i, \end{cases} \tag{2}$$

where $a > 0$. The cost is proportional to the difference $c_i - s_i$. Note that the revoking function captures the notion that the cost of revoking a partial commitment is strictly increasing to the extent that it is actually revoked.

2.3 The payoffs

Country i's payoff from a pair of strategies is $c = (c_A, c_B)$ by $P_i(c)$.

Let us consider the payoffs when the chosen partial commitments c_A and c_B are such that $c_A + c_B \leq S$. In this case, neither country revokes its partial commitment: the share s_i of the pool obtained by country i is such that $s_i \geq c_i$. Specifically, the share obtained by country i is given by $l_i(c)$, where l_A and l_B are any functions such that $l_A(c) \geq c_A$ and $l_B(c) = S - l_A(c) \geq c_B$.[3]

If $c_A + c_B \leq S$ agreement over the partition of the pool of companies is struck, at least one of the countries must have revoked its partial commitment.

The set $\Omega(c)$ of possible utility pairs that can be the outcome of the bargaining process is constructed using the set X of possible partitions of the pool of companies and the utility functions U_A and U_B, where:

$$X = \{(s_A, s_B) : 0 \leq s_A \leq S \text{ and } s_B = S - s_A\}. \tag{3}$$

That is, the set $\Omega(c)$ is the union of all pairs $(U_A(s_A, c_A), U_B(s_B, c_B))$ for $(s_A, s_B) \in X$.

Indeed, for each pair $c \in [0, S]^2$ such that $c_A + c_B > S$, the set $\Omega(c)$ is the graph of the function $f(.; c)$ defined by:

$$f(u_A; c) = U_B\left(S - U_A^{-1}(u_A; c_A); c_B\right), \tag{4}$$

[3] For example, it may be assumed that $l_i(c) = c_i + (S - c_A - c_B)/2$. Hence, if $c_A + c_B \leq S$, then country i's payoff is: $P_i(c) = l_i(c)$.

where the domain and range of $f(.;c)$ are, respectively, the closed intervals $[-a_A c_A, S]$ and $[-a_B c_B, S]$. Notice that $f(.;c)$ is concave and strictly decreasing in u_A.

If the countries do not reach agreement, each country obtains a zero payoff, which can be called the *disagreement point*.

2.4 The equilibrium

This section derives the two Nash equilibriums of the model described above. Two scenarios can be drawn: when players reach agreement in the negotiation stage and when they do not. First, when players do not reach agreement it is possible that there exist values of c_A and c_B such that $f(0;c) \leq 0$; in this case, $P_A(c) = P_B(c) = 0$. However, if $f(0;c) > 0$, then the payoff pair $(P_A(c), P_B(c))$ is defined as the Nash bargaining solution of the bargaining problem $(\Omega(c), d)$, with the disagreement point $d = (0,0)$. That is, $(P_A(c), P_B(c))$ is the unique solution to the following maximization problem:

$$\begin{aligned} &\max_{u_A, u_B} u_A u_B \\ &\text{subject to } u_B = f(u_A;c),\ u_A \geq 0 \text{ and } u_B \geq 0 \end{aligned} \tag{5}$$

Here, the bargaining process – in other words tax competition – leads to a race to the bottom. This is an interesting Nash equilibrium since it opposes the usual results from approaches based on non-cooperative games. Indeed, a race to the bottom is not a Nash equilibrium in a non-cooperative game.

Second of all, players can reach agreement in the negotiation stage. But in the second stage, two situations can be observed: incompatible commitments and compatible commitments.

With incompatible commitments, any pair of *more-than-compatible* partial commitments is not a Nash equilibrium, that is if $c_A + c_B < S$, then the pair $c = (c_A, c_B)$ is not a Nash equilibrium. There exists an i such that $S - c_j > l_i(c),\ (j \neq i)$; otherwise, $l_A(c) \geq S - c_B$ and $l_B(c) \geq S - c_A$ implies that $c_A + c_B \geq S$. Hence, country i can benefit from a unilateral deviation $c_i' = S - c_j$. A generalization of this result with a concave $f(.;c)$ is that any pair of incompatible commitments is not a Nash equilibrium. Assuming that $f(0;c) > 0$ and $P_B(c) < c_B$, then country B can benefit from a decrease in its partial commitment to $c_B' = c_B - e$ for some e such that $0 < e < c_B$.

With compatible commitments, any pair of *exactly-compatible* partial commitments that does not satisfy a particular condition is not a Nash equilibrium: when $c_A + c_B = S$ but $c_B / c_A \neq c$, where $c \equiv (1 + a_B)/(1 + a_A)$, then the pair $c = (c_A, c_B)$ is not a Nash equilibrium. But the model with commitment tactics has a unique Nash equilibrium, namely:

$$c_A^* = \frac{S}{1+c} \text{ and } c_B^* = \frac{Sc}{1+c}. \tag{6}$$

In other words, both countries do not benefit from a unilateral deviation to a partial commitment. To see that, suppose country A unilaterally deviates to $c_A' = c_A^* + e$, where e is such that $0 < e \leq S - c_A^*$. The payoff pair is $(P_A(c'), P_B(c')) < (P_A(c), P_B(c))$. In that case the deviation is not profitable. The same argument holds true for country B, which

does not benefit from a unilateral deviation to a partial commitment $c'_B \neq c^*_B$. The Nash equilibrium is, thus, Pareto-optimal, and since it is a finite-horizon game, it will be chosen by backward induction over the first Nash equilibrium found earlier.

3. Conclusion and policy implications

This paper aims to shed light on a very important tax question in a monetary union, specifically the Euro-zone: can tax competition between countries lead to a race to the bottom? It starts with a traditional empirical analysis of the evolution of taxes in the Euroland, both at the level of the zone as a whole, and for each country separately, and examines the evolution of the tax burden, and tax burdens on immobile and mobile assets. The data suggest that a race to the bottom does not seem to have, in general, taken place in Europe from 1965 to 2003. Yet, these facts do not guarantee that a race to the bottom will not happen in the future, especially with the higher degree of integration that the European Monetary Union creates over time.

To study this theoretical question we build a game theoretical model introducing a bargaining situation between countries with costs of changing tax policies.

The model is a two-stage game. It starts with a one shot, static game where the two countries agree on how to share total income. In the second stage, the countries enter a formal negotiating process and try to reach agreement. A country that would not respect its commitment incurs revoking costs. The existence of these costs is the key element in preventing a race to the bottom. Further research in political economy could look at the

precise definitions of these costs: a political end for an incumbent candidate who previously decreased public expenditure, the fine of the Stability and Growth Pact, etc.

Such a fairly abstract model sheds light on the paramount importance of tax policy in Europe, and, more generally, in a monetary union.

The model has two main policy implications. Firstly, it demonstrates that tax competition is not likely to lead to a race to the bottom between countries. It brings a theoretical argument against the usual fear of a race to the bottom in Europe.

Secondly, the paper shows that if revoking costs do exist, tax harmonization policies are not useful if based upon fears of a race to the bottom,. Advocates of tax harmonization should base their reasoning upon other assumptions. Indeed, this does not mean that some harmonization policies may not be justified on the basis of optimal policy coordination between countries, and for Europe to converge towards an optimum currency area (OCA). Except for inequality or welfare concerns, tax competition may also be a reasonable way to discipline countries, and to prevent them from facing an increasing total tax burden.

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