

Federal Reserve Bank of Minneapolis
Research Department Staff Report 348

October 2004

**Comment on Mendoza and Tesar's
"Why Hasn't Tax Competition Triggered a Race to the Bottom?
Some Quantitative Lessons from the EU"***

Ellen R. McGrattan

Federal Reserve Bank of Minneapolis

ABSTRACT

With a monetary union in place, many European countries are now debating if and how to coordinate their tax policies. Of particular interest to EU ministers is taxation of mobile factors like capital. Mendoza and Tesar (MT) use a game-theoretic approach to address the question, What is the outcome of tax competition and tax coordination when countries choose the tax on capital income and adjust other tax rates to keep revenues constant? MT predict very large welfare gains (losses) to tax competition for European countries that had high (low) tax rates prior to financial integration. In particular they predict a large gain for the United Kingdom and a large loss for countries in continental Europe. A second finding is that the welfare gains of tax coordination relative to that of tax competition are small. I discuss these findings in light of current policy debates and possible future extensions of this work.

*This discussion was prepared for the 2004 Carnegie-Rochester Conference on Public Policy. I received very helpful comments from my colleagues at the Federal Reserve Bank of Minneapolis. The views expressed herein are those of the author and not necessarily those of the Federal Reserve Bank of Minneapolis or the Federal Reserve System.

1. Introduction

With a monetary union in place, many European countries are now debating if and how to coordinate their tax policies. The European ministers are particularly interested in the question of how to tax capital income so as “to prevent significant losses of tax revenue; and to help tax structures to develop in a more employment-friendly way, notably by reversing the trend of an increasing tax burden on labor as compared with more mobile tax bases.”¹

Mendoza and Tesar use a game-theoretic approach to address the question, What is the outcome of tax competition and tax coordination? They model countries as players in a one-shot game choosing a tax rate on capital income taking as given the tax rates of other countries. They consider two types of experiments: symmetric games between countries starting with the same initial tax regimes and asymmetric games between countries starting with different initial tax regimes (and hence different allocations). They compute equilibria for noncooperative play and for cooperative play.

In my comments, I focus on two of MT’s main findings and relate them to policy discussions in Europe. The first finding is the outcome of a noncooperative game played by asymmetric players, the United Kingdom and a representative of continental Europe who choose capital tax rates taking as given tax rates of the other country and adjusting their labor tax rates to keep revenues constant. MT assume that the United Kingdom and continental Europe are identical in all respects except in their pre-game tax regimes. For this asymmetric game, MT find that the welfare gains to tax competition are large and positive for citizens in the United Kingdom and large and negative for citizens of continental Europe. This result is due to the fact that MT assume the United Kingdom has high capital tax rates and a low capital stock prior to playing the tax competition game. With tax competition, the UK lowers its tax rate from 53 percent to 20 percent, inducing a large increase in the return on capital and an influx of capital from continental Europe. Continental Europe, on the other hand, has to increase both capital and labor tax rates to make up lost revenues to the UK.

¹ Communication from the Commission of the European Communities to the Council and the European Parliament (*A Package to Tackle Harmful Tax Competition in the European Union*) 1997.

The results of the asymmetric game lead me to explore two sets of questions. First, how should I view the optimization problems being solved by the countries in MT's model? Two otherwise identical countries have very different policies (and allocations) in the pre-game regime. What overall optimization problem leads us to these initial conditions? Second, what assumptions of MT are critical for the quantitative results? MT assume one type of capital with no foreign ownership. The only foreign asset is a bond with income that is tax free. They also assume away any dynamic considerations and model the game as a one-time choice of a capital tax rate.

The second finding of MT that I discuss is, in my view, the main finding of the paper and answers the question, Are there gains to EU tax cooperation? In most of the games they analyze, MT find that the gains of tax coordination relative to that of tax competition are small. The equilibrium capital income tax rates chosen in the noncooperative games are very close to those chosen in the cooperative games. Furthermore, the welfare gains to cooperating are small.

As with all interesting and provocative papers, this paper leads us to think about new directions for research. I conclude with my thoughts on future directions.

2. Two-Country Games

MT compute equilibria for two-player one-shot games. The players are countries. The action that each takes is to choose a capital tax rate τ_k . MT consider two types of equilibria: Nash and cooperative. Let me denote the outcome of the Nash game as τ_k^N and the outcome of the cooperative game as τ_k^C .

For the Nash game, MT solve

$$\tau_k^N = \operatorname{argmax} V(\tau_k|\tau_k^*), \quad \tau_k^{*N} = \operatorname{argmax} V^*(\tau_k^*|\tau_k)$$

where τ_k^N is the tax rate of the first country (home) and τ_k^{*N} is the tax rate of the second country (foreign). The value function is

$$V(\tau_k|\tau_k^*) = \max\left\{\max\sum_{t=0}^{\infty}\beta^t U(c_t, l_t)\right\}$$

$$\begin{aligned}
\text{s.t. } c_t + x_t + \text{new bonds} &\leq w_t l_t + (1 - \tau_k) r_t k_t + \tau_k \delta k_t \\
&\quad + \text{bonds} - \text{other taxes} + \text{transfers} \\
k_{t+1} &= (1 - \delta) k_t + x_t - \phi(x_t/k_t) k_t
\end{aligned}$$

with initial values for k_0 and bond holdings. The value function V^* has the same form with home variables replaced by foreign analogues and vice versa.

I have written the problem without specific notation for the bonds, other taxes, and transfers. The intent is to show starkly that the model economies are standard one-sector growth models. Furthermore, if the bond markets are not operating, the economies are closed. If they are operating, the choice of foreign tax rate τ_k^* can affect the home country because rates of interest on foreign and domestic bonds are equated in equilibrium.

For the cooperative game, MT solve

$$\begin{aligned}
(\tau_k^C, \tau_k^{*C}) &= \text{argmax } \lambda V(\tau_k | \tau_k^*) + (1 - \lambda) V^*(\tau_k^* | \tau_k) \\
\text{s.t. } V(\tau_k^C | \tau_k^{*C}) &> V(\tau_k^N | \tau_k^{*N}), \quad V^*(\tau_k^{*C} | \tau_k^C) > V^*(\tau_k^{*N} | \tau_k^N).
\end{aligned}$$

For their applications, MT relate the outcomes of the games to the experience of continental European countries, namely France, Germany, and Italy, and to the experience of the United Kingdom. They take tax regimes in the early 1980s as natural initial conditions. They view the early 1980s as a period when financial markets in Europe became more integrated.

With these applications in mind, it is worth noting some of the critical assumptions that MT make. First, there is no inherent difference between countries. All individuals, regardless of country of origin, have the same preferences. The same technologies are available in all countries. MT do allow for the possibility that tax regimes are different initially. This implies that initial capital stocks and bond holdings may differ.

Second, MT's model economy has only one type of capital. But the design of optimal tax unions depends crucially on certain characteristics of capital, like its mobility, substitutability, and tangibility. A house has very different characteristics than a patent although

both are included in MT's capital stock k . Partly because of the different characteristics, the tax treatment on different stocks varies in most countries.

A third important assumption that MT make concerns asset ownership. The only way for foreign tax rates to affect the domestic households is through the bond market. MT treat interest income as tax-free although it is not in the countries they consider. They also assume that there is no direct foreign ownership of domestic equities or capital stocks, despite the large observed rise in cross-ownership.

Finally, it is important to note that the game being analyzed is static. Countries choose a single tax rate and commit to it forever. This has obvious drawbacks when comparing the outcomes to the negotiations in Europe over tax competition and coordination.

3. Interpreting the Outcomes of the Games

Here, I discuss and interpret a subset of the experiments in MT. For these experiments, I argue that the modeling assumptions I just described may be critical for some of the findings.

The experiments I consider are the Nash and cooperative capital income tax games in which labor tax rates are adjusted to keep revenues fixed. In Table 1, I show MT's results (from Table 7) for two games: a symmetric game and an asymmetric game. In the symmetric game, the two countries have the same initial tax rates and the same initial capital stocks and bond holdings. In the asymmetric game, MT allow for different initial tax rates, capital stocks, and bond holdings across the two countries.

The upper panel of Table 1 shows the results of a game played between two countries with the same initial conditions. The pre-game tax rates on capital and labor are 27 and 37 percent, respectively. These rates are estimated averages for France, Germany, and Italy in the early 1980s. MT's rationale is that the early 1980s is the period when barriers to financial integration were beginning to be overcome.

The lower panel of Table 1 shows the results of a game between the United Kingdom and a representative of continental Europe. Notice that the initial tax rate on capital

Table 1. Nash and Cooperative Equilibria of Capital Income Tax Games^a

	Tax Rates and Welfare Gains (in %)		
	Initial	Nash	Cooperate ^b
Symmetric Game:			
Tax on Capital	27	27	37
Tax on Labor	37	37	34
Small gains ^c		.02	.28
Asymmetric Game:			
Continent			
Tax on Capital	27	30	34
Tax on Labor	37	40	38
Big losses ^c		-2.2	-2.0
UK			
Tax on Capital	53	20	25
Tax on Labor	25	32	31
Big gains ^c		3.9	4.0

^a Labor tax rates are adjusted to make keep revenues constant.

^b Tax rates and welfare gains are averages across equilibria.

^c Percent of consumption required for indifference between policies.

for the United Kingdom at 53 percent is much higher than the 27 percent estimate for continental Europe. On the other hand, the labor tax rate at 25 percent is much lower than the 37 percent estimate for continental Europe.

Consider first comparing the pre-game rates with the equilibrium rates from playing Nash. If both countries start out in 1980 with tax rates of 27 and 37 percent on capital and labor, respectively, then the Nash equilibrium outcomes are almost exactly the same. Gains to tax competition are negligible (.02 percent). The asymmetric game, on the other hand, implies large changes in U.K. tax rates and enormous welfare gains and losses. The United Kingdom lowers its tax rate considerably from 53 percent to 20 percent. Because the initial U.K. capital stock is at a low level, consistent with very high tax rates, there is a

large influx of foreign investment to take advantage of the high return to capital. With an alternative source of financing, the U.K. consumption need not fall during the transition period to a higher capital stock. Thus, the welfare gains are very high. For continental Europe, on the other hand, tax rates have to rise to make up lost capital income tax revenues. With both rates up, welfare falls and the loss is large.

It is important to consider these results in light of model assumptions. There are no differences in preferences or technologies across countries. Thus, we should question why the United Kingdom chose to have such high tax rates on capital initially. What overall optimization problem can account for the pre-game initial conditions and the game outcomes?

MT's model has only one type of capital with its mobility dictated by the adjustment cost function $\phi(x/k)$. A large fraction of the capital stock is housing and office buildings which are completely immobile. In fact most of the debates in Europe concern corporate capital income tax rates and incomes from activities such as financial services that are highly mobile. If the United Kingdom lowers its corporate tax on capital, this does not necessarily imply a significant drop in the capital tax base of continental Europe.

Having multiple types of capital in the model can also have a large effect on the gains to increased access to foreign asset markets. If individuals within a closed economy only have access to one highly taxed asset, it is not surprising to find that access to a second low-tax asset can imply a large gain in welfare. If instead there are multiple types of fixed and financial assets available within the domestic economy, then a change in one tax implies a shift of investments to equate after-tax returns. It need not imply a large change in the sequences of consumption and leisure. Thus, it need not imply a large gain or loss in welfare.

To get a more accurate prediction of the winners and losers in tax competition, it is also important that the national accounts and flow of funds in the model reflect the national accounts and flow of funds for Europe. If foreign asset holdings are large, it is not clear whose welfare is being maximized.

Another assumption that MT make that may be important for the results is that the game is static. MT acknowledge that their exercise is a first step and thus their results may change if they take into account dynamic considerations.

Let me now turn to MT's results on the gains from cooperation. A comparison of the second ('Nash') and third ('Cooperate') columns of Table 1 shows a robust result. This comparison shows that the gain to cooperation is small. For the symmetric game, the gain is only 0.26 percent of consumption. For the asymmetric game, the gain is even smaller, between 0.1 to 0.2 percent. This is interesting in light of the current discussions to coordinate on corporate income tax rates. MT show that there may be little gained from such coordination.

4. Open Questions

In this section, I discuss some open and interesting issues related to European tax competition and cooperation.

MT do not analyze the recent Irish experience. Ireland currently has a 12.5 percent corporate income tax rate. In many of the discussions about instituting lower bounds on corporate rates, the Irish are held up as a reason not to do it. They have had lower tax rates and spectacular growth in recent years. What would MT find if they included Ireland?

A better connection between the model assumptions and the country flow of funds accounts is needed to understand who owns what and who gains or loses with tax competition. It is certainly not the case, as MT assume, that domestic capital is owned entirely domestically. Foreign ownership is on the rise. How important are the foreign holdings for the countries MT consider?

An extension to multiple capital stocks seems essential to accurately predict welfare gains. Most of the policy debates are focused on specific types of capital and specific tax rates. What is the outcome of corporate income tax competition and corporate income tax coordination?

In MT and most of the policy papers, there is a lot of discussion about revenues and little about expenditures. If government obligations were local services or social services for citizens within a country, then there may be no need for a European-wide tax policy. If the obligations are European defense, then there may be some need for EU coordination. Do the tax competition and coordination results depend critically on what is being financed?

Tax policies are not simply tax rates but also include rules about tax exemption or deferral. Changes in these rules can be as important as changes in statutory tax rates. In the United States, for example, changes in laws governing the tax status of retirement accounts had a significant effect on effective income tax rates during the 1980s. If social security systems in Europe are soon bankrupt, then we will see proposals promoting private retirement saving. How would these savings incentives change the outcome of the tax competition and tax coordination?

5. Conclusion

M-T take on two tough but highly relevant policy questions. What are the gains to tax competition? What are the gains to tax cooperation? Their answer on the first is tears for continental Europe and cheers for the British. But that is in large part due to initial conditions. The main message of this paper is that the gains to cooperation, at least in these two-country static games, is very small.

Like all good papers, this paper makes me think that there is a lot of work still to be done before we can get a better understanding of the outcomes of European financial integration.