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TAX COMPETITION AND ASYMMETRIC COUNTRIES

Anton Jevcak

Research Assistant, University of Dortmund
LS Öffentliche Finanzen, Vogelpothsweg 87,
44221 Dortmund, Germany
jevcak@gmx.de
Tel: +49 231 755 3440,
Fax: +49 231 755 5404

This paper explores the consequences of a difference in the levels of public inputs accumulated over time in a small open economy model where capital tax revenues are used exclusively for the provision of public inputs, while the government sets the capital tax rate in way to maximise its country's national income. It is shown that in this case the optimal capital tax rate in a country is a decreasing function of its stock of accumulated public inputs. The model thus implies that capital tax harmonisation could actually be detrimental to the so-called core EU member states as it could fix their capital tax rates at an in-optimally high levels and thus hinder their ability to dampen undesirable capital outflows.

Keywords: *tax competition; public inputs; capital mobility; asymmetric countries*

Introduction

The latest enlargement of the EU brought together a group of countries which are more heterogeneous sthan ever before. Apart from having significantly different levels of per capita GDP these countries offer potential foreign investors different levels of the so-called industrial public goods/publicly provided inputs while charging diverse tax rates. This increased heterogeneity might be seen as a reason for corporate tax harmonisation in the EU, as it might be argued that the need for a "fair" framework for capital investment competition within the internal market has increased. On the other hand, it might also be argued that the increased heterogeneity makes it more difficult to find a single tax rate or a lower bound on corporate tax rates suitable for the whole EU.

Krogstrup (2004, p. 14) in one of the latest surveys of the capital tax competition literature notices that only a few papers have so far analysed tax competition among asymmetric countries. Moreover, the source of asymmetry in the countries' factor endowments has until now been only restricted to the private factors of production, notably capital and labour (Bucovetsky, 1991; Wilson, 1991).

The main implication of these models is that a country with a larger population experiences a lower elasticity of capital to the tax rate, that is a lower marginal cost of public funds, and thus sets a higher tax rate than does

the country with a smaller population. Both models, however, are based on the assumption that governments levy taxes on capital in order to finance the provision of public goods which only benefit their countries' populations and have no impact on capital productivity. Hence, the models' conclusions are driven by the discrepancy between the government's budget revenue and expenditure side, or in other words, only the revenue side of public sector plays a role in these models.

Tax systems designed in this way have been criticised, among others, by McLure (1986) or Salin (1990) who suggested that the tax revenue structure in a country should more closely reflect the expenditure structure. That is, public goods provided to increase the welfare of citizens should be paid for by taxation of citizens, while the supply of public inputs that enhances capital productivity should be financed by capital taxation.

Furthermore, governmentally provided inputs like infrastructure, education, national defence or effective police and legal system, which also influence the locational decisions of capital investments, have to be built up over many years and thus their levels cannot be adjusted instantaneously. There is therefore in the given period no perfect correlation between the total public revenues and the overall levels of provided public inputs, as these are also determined by history and geography.

Nevertheless, although countries differ in the levels of government-provided inputs, the models of tax competition with public inputs, to my knowledge, have so far always assumed identical jurisdictions (see, for instance, Zodrow and Mieszkowski, 1986; Fuest, 1995; Bayindir-Upmann, 1998, or Rauscher, 1997).

Hence, this paper explores the consequences of a difference in the levels of public inputs accumulated over time in a small open economy model, where capital tax revenues are used exclusively for the provision of public inputs, while the government sets the capital tax rate in way to maximise its country's national income. It is shown that in this case the optimal capital tax rate in a country is a decreasing function of its stock of accumulated public inputs.

The paper can be viewed as a contribution to the debate about capital tax harmonisation in the enlarged EU where the new member states offer both significantly lower levels of accumulated public inputs and lower capital tax rates than the old member states while needing to attract as much FDI as possible. Contrary to the traditional view, the model offered here implies that capital tax harmonisation could actually be detrimental to the so-called core EU member states as it could fix their capital tax rates at sub-optimally high levels and thus hinder their ability to dampen undesirable capital outflows.

This interpretation is supported by the April 2004 World Economic Outlook (WEO) which analysed structural reforms in 20 industrial countries (13 elder EU member states + 7 non-EU countries) over the past three decades. It showed that contrary to the financial sector, selected product markets and international merchandise trade, labour markets and tax systems underwent only minor reforms in this period. Furthermore, the WEO offered empirical evidence in favour of the "back-against-the-wall" argument which states that difficult economic conditions stimulate the reform process (IMF, 2004).

It can thus be argued that because of the significantly worse economic conditions over the last decade the new member states have been forced to adjust their capital tax rates clo-

ser to the optimal levels, while the capital tax rates in the older member states still need to be substantially corrected. As a result, harmonising capital tax rates at the levels currently observed in the so-called core EU member states would only induce unwanted capital outflows from the whole enlarged EU, while allowing for tax competition could finally force the older member states to cut their capital tax rates closer to the optimal levels.

A simple model

A small open economy is modelled. It offers the capital located at its territory (K) an industrial public good (G) which consists of a stock of public inputs accumulated over time ($G^S > 0$) and of public inputs financed through capital taxation (G^T). Setting $G^T = TK$, where $T > 0$ is a tax rate on a unit of capital invested in the country, implies that in the given period

$$G = G^S + TK. \tag{1}$$

The stock of public inputs accumulated over time, G^S, stands for publicly provided inputs like infrastructure, educated workforce, national defence and effective police and legal system which have been built up over the years and are thus independent of the current tax revenues.

There is a single aggregate good which can be either consumed or used as a production input. The aggregate good is produced according to a neoclassical production function $Y(K, G)$ exhibiting non-increasing returns to scale in the two production inputs K and G, with $Y_K, Y_G > 0$, $Y_{KK}, Y_{GG} < 0$ and $Y_{KG} > 0$, where the subscripts indicate the respective derivatives.

As capital is perfectly mobile between the small open economy and the rest of the world, after-tax profit per unit of capital has to equal the world rate of interest, $R > 0$, that is

$$Y_K - T = R. \tag{2}$$

Differentiating this capital market arbitrage condition with respect to the tax rate while substituting for G from equation (1) reveals that

$$Y_{KK}K_T + Y_{KG}(K + TK_T) - 1 = 0. \tag{3}$$

Solving equation (3) for K_T gives

$$K_T = \frac{1 - Y_{KG}K}{Y_{KK} + Y_{KG}T}. \tag{4}$$

Equation (4) indicates that if the government provided public inputs at the level where the marginal decrease in capital income induced by a higher capital tax rate (dTK) is exactly equal to the increase in the capital income generated by a marginal increase in the public input provision ($Y_{KG}KdTK$), then a marginal change in T would have no impact on the stock of capital located in the small open economy ($K_T = 0$).

The national income of a country is in this model given by its domestic production (Y) minus the tax revenues (TK) and minus the income earned by the foreign capital invested there $R(K - \overline{K})$, where $\overline{K}$ denotes the stock of capital owned by the home country's citizens. Suppose that the government sets the capital tax rate T as to maximise its country's national income, that is

$$\begin{aligned} &\text{Max}_T\ Y - TK - R(K - \overline{K}), \\ &\text{hence } Y_K(K_T) + Y_G(K + TK_T) - \\ &- K - TK_T - RK_T = 0. \end{aligned} \tag{5}$$

Substituting for Y_K from equation (2) then implies that

$$Y_G(K + TK_T) - K = 0 . \quad (6)$$

Using a production function of the form $Y = K^{\alpha}G^{\beta}$, with $\alpha + \beta < 1$[1], rearranging equation (4) and subsequently substituting for G and Y_K from equations (1) and (2) leads to

$$K_T = \frac{1 - \beta G^{-1} Y_K K}{(\alpha - 1) Y_K K^{-1} + \beta G^{-1} Y_K T} = \quad (7)$$

$$= \frac{1 - \beta (G^S + TK)^{-1} (R + T) K}{(\alpha - 1)(R + T) K^{-1} + \beta (G^S + TK)^{-1} (R + T) T} .$$

Equation (6) can in this case be rewritten as

$$\frac{\beta K (R + T)}{\alpha (G^S + TK)} \left(K + \right.$$

$$\left. + \frac{T\left(1 - \beta (G^S + TK)^{-1} (R + T) K\right)}{(\alpha - 1)(R + T) K^{-1} + \beta (G^S + TK)^{-1} (R + T) T} \right) = K . \quad (8)$$

Solving equation (8) for T gives

$$T = \frac{\beta RK - \alpha G^S}{\alpha K} . \quad (9)$$

Equation (9) reveals that if the country's stock of accumulated public inputs is relatively small compared to the level of capital invested there ($\alpha G^S < \beta RK$), then the government has an incentive to increase public input provision through a positive tax rate levied on the capital invested at its territory. This is assumed to be the case, since in the dynamic context (which is ignored here for the sake of analytical tractability) with a positive depreciation rate of the stock of public inputs, a capital tax rate equal to zero could not be sustained in the long run as eventually $\alpha G^S < \beta RK$ would be fulfilled for a $T > 0$.

Differentiating equation (9) with respect to G^S then shows that

$$T_{G^S} = G^S K^{-2} K_{G^S} - K^{-1} \quad (10)$$

In order to determine K_{G^S}, the capital market arbitrage condition has to be differentiated with respect to G^S which implies that

$$Y_{KK} K_{G^S} + Y_{KG} (1 + TK_{G^S}) = 0 \quad (11)$$

and thus that

$$K_{G^S} = -\frac{Y_{KG}}{Y_{KK} + Y_{KG} T} . \quad (12)$$

Using again the production function of the form $Y = K^{\alpha}G^{\beta}$, with $\alpha + \beta < 1$, equation (12) can be rearranged so that

$$K_{G^S} = -\frac{\beta G^{-1} Y_K}{(\alpha - 1) K^{-1} Y_K + \beta G^{-1} Y_K T} =$$

$$= -\frac{\beta K}{(\alpha - 1)(G^S + KT) + \beta KT} . \quad (13)$$

Equation (13) demonstrates that K_{G^S} is always positive as the denominator of the ra-

[1] As discussed in Rauscher (1997), the upper limit of unity should be well above any reasonable estimates of $\alpha + \beta$.

tio on the RHS of equation (13) is always negative for $\alpha + \beta < 1$. This is an intuitive result, as a higher stock of accumulated public inputs makes the given country a more attractive location for capital investment.

Finally, substituting equation (13) into equation (10) gives

$$T_{G^S} = -\frac{\beta G^S}{((\alpha-1)G+\beta KT)K} - K^{-1} =$$

$$= -\frac{1}{K}\left(\frac{\beta G^S}{((\alpha-1)G^S+(\alpha+\beta-1)KT)}+1\right). \quad (14)$$

The expression in brackets can be shown to be always positive as

$$\frac{\beta G^S}{((\alpha-1)G^S+(\alpha+\beta-1)KT)}+1>0 \quad (15)$$

can be rewritten as

$$\beta G^S < ((1-\alpha)G^S+(1-\alpha-\beta)KT) \quad (16)$$

which holds for all $\alpha + \beta < 1$.[2] Hence, equation (14) implies that the optimal capital tax rate of a small open economy is a decreasing function of its stock of accumulated public inputs.

This result is induced by the concave aspect of the production function ($Y_{KGG} < 0$) which implies that the positive impact of a capital tax financed marginal increase in public input provision on capital productivity decreases in the amount of public inputs already offered by the given country.[3] Therefore, a country with a higher stock of accumulated public inputs should have a lower incentive to increase capital tax rates.

Conclusion

This paper is an attempt to complement the rather scarce literature on capital tax competition among asymmetric countries. It focused on the so far ignored aspect of the asymmetry among the countries that differ in the levels of public inputs accumulated over time, while assuming that the public expenditure structure closely reflects the public revenue structure, i.e. is that capital tax revenues are used exclusively on the provision of public inputs.

The simple model offered in this paper demonstrates that a less developed country (a country with a smaller stock of public inputs) trying to maximise its national income should set a higher capital tax rate than a more developed country (a country with a larger stock of public inputs) which is also trying to maximise its national income. This is caused by the fact that the positive impact of public input provision on capital productivity decreases in the overall level of public inputs provided.

This conclusion is in direct contradiction to the situation currently observed in the enlarged EU and to the usual arguments for tax harmonisation in the EU. If, however, the "back-against-the-wall" argument is accepted, that is if one believes that the harsher economic conditions forced the new member states

[2] In the case of $\alpha + \beta = 1$, the RHS of equation (14) is equal to zero and thus the optimal capital tax rate of a small open economy in this case does not depend on its stock of accumulated public inputs.

[3] This concave aspect disappears in the case of $\alpha + \beta = 1$, as a decrease in the marginal productivity of public input implied by its larger accumulated stock is in this case exactly offset by a capital inflow induced by a larger provision of public input.

to adjust their capital tax rates closer to the optimal levels while the capital tax rates in the elder member states do not reflect efficiency consideration, then the model's implications for the enlarged EU become more apparent.

In this case, it can be argued that harmonising capital tax rates at the sub-optimally high levels presently observed in the so-called core EU member states would not only further hinder the ability of these countries to drive down the unwanted capital outflows, but it would also dampen the economic development in the new member states.

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MOKESČIŲ KONKURENCIJA IR ASIMETRIŠKOS ŠALYS

Anton Jevtak

Santrauka

Straipsnyje nagrinėjami klausimai, susiję su padarniais, esant skirtingiems visuomeninių indėlių, sukauptų per tam tikrą laiką mažos atviros ekonomikos atveju, lygiams, kai turto mokesčių įplaukos yra panaudojamos tik visuomeninių indėlių aprūpinimui, o vykdomoji valdžia nustato turto mokesčio tarifą, kad padidintų savo šalies nacionalines pajamas. Taigi optimalus turto mokesčio tarifas šalyje yra mažėjanti sukaupto kiekio visuomeninių indėlių funkcija. Modelis parodo, kad turto mokesčio suderinimas gali iš tikrųjų būti nuostolingas vadinamosioms ES šerdies šalims narėms, kadangi atliekant harmonizavimą gali būti nustatyti neoptimaliai dideli jų turto mokesčio tarifai ir taip trukdoma jų galimybėms sumažinti nepageidaujamus turto nuotėkius. Straipsniu bandoma papildyti literatūrą apie nesimetriškų šalių turto mokesčio palyginimą. Publikacijoje susitelkta ties mažai paisomu aspektu dėl asimetrijos tarp šalių, joms per laiką sukaupiant skirtingo dydžio visuomeninių indėlių, tariant, kad visuomeninių sąnaudų struktūra gerai atspindi visuomeninių pajamų struktūrą, t. y. kad turto mokesčio įplaukos yra naudojamos tik visuomeniniams indėliams aprūpinti.

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