Tax Competition and Equalization with Asymmetric Regions

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Abstract

This is a note on welfare improvements through equalization systems in the presence of tax competition. Bucovetsky and Smart (2006) and Köthenbürger (2002) show, that equalization systems can internalize externalities of strategic tax decisions made by (even asymmetric) regions. This paper takes a closer look at the requirements of such a equalization system. It turns out that in some regions the contribution rate needs to be higher than the tax rate. Efficient tax rates are then implemented at the expense of positive incentives for local authorities.

Keywords: tax competition, equalization, asymmetric regions

JEL-Classification: H2, H5, H7

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1 Introduction

Beginning with Köthenbürger (2002) and Bucovetsky and Smart (2006) literature focus on the idea of enhancing welfare in markets of tax competition by fiscal equalization systems. Even though these systems might be imposed to equalize public spending in a federation with tax autonomy they can set incentives for local governments to raise their tax rates. Since outflowing capital is compensated by higher grants, local governments tend to set higher tax rates. The theoretical result is confirmed by several empirical works (e.g. Dahlby and Warren, 2003, Büttner, 2006, and Smart, 2007).

This paper is clearly in the tradition of this idea. However, it takes a closer look at the requirements of the equalization system itself. For a simple case of unequal capital endowments regions need to serve a higher contribution to the system than they gain revenue from capital taxation. Even though this is possible with accompanying transfers within this system, it is not conform with the idea of setting positive incentives to local governments. It is conceivable that such a contribution will not encourage them to expand their tax base. Instead of feeling responsible for their budget, regions will rely on the central government to finance local public spending. Therefore this result is in contrast to a central requirement for equalization systems.

The paper is structured as follows. The next section introduces a simple model. Section 3, then, analyzes the tax competition before section 4 takes a closer look on the equalization system. The last section provides a conclusion.

2 The Model

A federal economy consists of two regions. In each region $i = 1, 2$ a representative firm is located. Using the mobile factor capital k_i and the immobile factor land, it produces using a linear-homogeneous technology f. Since land is equal in both regions, the technology can be reduced to $f(k_i)$. In a competitive market the profit of each firm is zero. The price for capital equals the interest rate r plus the tax rate τ_i on it. The firms employ capital so that $f'(k_i) = r + \tau_i$ is satisfied. From there the capital demand of the regions can be described by

$$\phi_i'(r + \tau_i) = k_i. \tag{1}$$

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Furthermore, from the profit maximization condition it follows $\phi_i'(\tau_i + r) = \frac{1}{f''} < 0$. In both regions residents offer land and savings to the market. Land is payed by a rent π_i. π_i is the residual of firms income and production costs so that $\pi_i = f(k_i) - k_i f'(k_i)$. Since land is immobile and equal in both regions local endowments only differ in terms of savings s_i. The capital stock in the federation is fixed so that $\Sigma s_i = \Sigma k_i$.

In both regions, a representative resident consumes a private good c_i and a public good g_i so that her utility u_i is

$$u_i = u(c_i, g_i) = c_i + b(g_i) \tag{2}$$

with $b'(g_i) > 0$ and $b''(g_i) < 0$. Since only capital employing firms are taxed, the private income is the sum of the rent π_i and the interest income rk_i.

The public good is offered by a well-behaving local government maximizing residents utility. To finance public spending a source-based tax τ_i is levied on employed capital. The budget of local government therefore equals

$$\tau_i k_i = g_i. \tag{3}$$

3 Tax Competition

In a decentralized economy, regions behave non-cooperatively and compete for capital using the source-based tax as a strategic variable. Ignoring the positive effect of rising taxes on other regions tax base local authorities will set inefficient low tax rates. As a benchmark case first a central government is analyzed. It is able to set tax rates in the regions and reallocate public income between the regions:

$$\max_{\tau_i, g_i} \Sigma u_i \quad s.t. \quad \Sigma \tau_i k_i = \Sigma g_i. \tag{4}$$

It follows form the first order conditions, that

$$-k_i + (s_i - k_i)\frac{\partial r}{\partial \tau_i} + b'(g_i)(k_i + \tau_i \phi'(r + \tau_i)(1 + \frac{\partial r}{\partial \tau_i})) \tag{5}$$

$$+(s_j - k_j)\frac{\partial r}{\partial \tau_i} + b'(g_j)\tau_j \phi'(r + \tau_j)\frac{\partial r}{\partial \tau_i} = 0$$

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with $i \neq j$. Furthermore $b'(g_1) = b'(g_2)$, so from equation (5) it follows $b'(g_i) = 1$. Public spending is equalized among both regions as well as the tax rates. $\frac{\partial u_i}{\partial c_i} = b'(g_i)$ holds so that first best efficiency is realized. This result is independent from the allocations of savings.

In a decentralized economy local governments maximize residents utility subject to the local budget:

$$\max_{\tau_i} \quad u_i \quad s.t. \quad \tau_i k_i = g_i. \tag{6}$$

From the first order condition it follows

$$b'(g_i) = \frac{k_i - (s_i - k_i)\frac{\partial r}{\partial \tau_i}}{k_i + \tau_i \phi'(\tau_i + r)(1 + \frac{\partial r}{\partial \tau_i})}. \tag{7}$$

While the terms in the numerator constitute the marginal effect on private consumption, the terms in the denominator represent the change of tax revenue when tax rates rise. For equal savings in the regions, $k_i = s_i$ holds and one can show that $b'(g_i) > 1$. Underprovision of public spending arises in both regions and an inefficient mix of private and public goods is consumed. When local governments increase tax rates, they generate an outflow of capital. Ignoring the positive fiscal externality to other regions, a local government will choose an inefficient low tax rate.

When $s_1 > s_2$, not only the fiscal, but the pecuniary externality must be taken into account. As non-price takers, regional governments influence the interest rate by their tax policy. Region 1, the capital exporting region, prefers a higher interest rate r than the capital importing region 2 because the interest income affects private consumption.[1]

Since $\frac{\partial r}{\partial \tau_i} < 0$, tax rates influence the interest rate negatively so that $\tau_1 < \tau_2$ in equilibrium. While the pecuniary externality resolves the problem of underprovision at least to some extent in region 2, it is aggregated in region 1.

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[1]This results are in contrast to Wilson (1991) and Bucovetsky (1991) where small regions turn out to have low tax rates. While in these models regions differ in terms of population size and have therefore unequal elasticity in the capital demand, here unequal saving are assumed.

4 Equalization

As decentral federations require autonomy for local authorities, constitutional reasons might prevent the central government to determine local tax policy and public spending. But in many federations equalization systems can be observed. Even though they aim to reallocate fiscal capacity, they also set an incentive to raise tax rates. To finance the equalizing grants y_i a marginal contribution rate ϑ_i on the local tax base is determined. Therefore local governmental budget is given by

$$(\tau_i - \vartheta_i)k_i + y_i = g_i. \tag{8}$$

with y_i as a lump sum transfer from the equalization system. Using its instruments ϑ_i and y_i the central planer maximizes residents utility subject the the central budget:

$$\max_{\vartheta_i, y_i} \ \Sigma u_i \quad s.t. \quad \Sigma \vartheta_i k_i = \Sigma y_i. \tag{9}$$

Again it follows from the first order condition $b'(g_1) = b'(g_2)$. Therefore the transfer system equalizes public spending like the central governments does. To identify the requirements of the equalization system the reaction of the local government is analyzed. Confronted with such a system local governments maximize residents utility subject to the budget:

$$\max_{\tau_i} \ u_i \quad s.t. \quad g_i = (\tau_i - \vartheta_i)k_i + y_i. \tag{10}$$

Looking at the first order condition one can show

$$b'(g_i) = \frac{k_i - (s_i - k_i)\frac{\partial r}{\partial \tau_i}}{k_i + (\tau_i - \vartheta_i)\phi'(\tau_i + r)(1 + \frac{\partial r}{\partial \tau_i})}. \tag{11}$$

When $s_1 = s_2$, the result from Köthenbürger (2002) and Bucovetsky and Smart (2006) holds: a full equalizing system internalizes the fiscal externality. Since no pecuniary externalities arise in this situation, first best efficiency is realized. With $\vartheta_i = \tau_i$ the fiscal externality is internalized and $b'(g_i) = 1$ holds. However, assuming an asymmetric capital endowment ($s_1 > s_2$), the pecuniary externality causes an additional downward pressure on the tax rate in region 1 but reduces the fiscal externality in region 2. The instruments must be chosen differently for each region.[2]

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[2]DePater and Meyers (1994) already introduced such a corrective device to internalize pecuniary externalities.

A closer look at equation (11) reveals the requirements to the system. Choosing $\vartheta_i = \tau_i$, the fiscal externality can be reduced to zero. But in the case of an capital importing region, this is not necessary because the pecuniary externality reduces the fiscal one. In order to realize $b'(g_i) = 1$ in both regions

$$-(s_i - k_i)\frac{\partial r}{\partial \tau_i} = (\tau_i - \vartheta_i)\phi'(\tau_i + r)(1 + \frac{\partial r}{\partial \tau_i})$$ (12)

needs to hold. But since $-(s_i - k_i)\frac{\partial r}{\partial \tau_i}$ is positive in region 1 but negative in region 2, $(\tau_i - \vartheta_i)$ must be negative for 1 but positive for 2. Thus $\tau_1 < \vartheta_1$ and $\tau_2 > \vartheta_2$ must be satisfied. Low tax rates lead to a high interest rate, so that the capital exporter is less willing to raise taxes. An equalization system therefore needs to set stronger incentives to capital exporters than to importers.

5 Results

This paper clearly follows the tradition of Köthenbürger (2002) and Bucovetsky and Smart (2006), showing that an equalization system is able to internalize externalities of tax competition. But by assuming regions are asymmetric in terms of capital endowment, the system does not only need to internalize fiscal but also pecuniary externalities. While the fiscal externality of capital importers are suppressed to some extent, it becomes increasingly difficult to implement efficiency in the capital exporting regions. The equalization system needs to set a contribution, which exceeds the tax revenue. Even though this is technically possible assuming lump sum transfers to the region, it contradicts all requirements of setting positive incentives for local authorities to expand their tax base. Instead regions will rely on the central government to finance local public spending. The aim of efficient tax rates therefore undermines positive incentives to local governments.

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