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Fiscal competition in a transition economy

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All opinions expressed are those of the authors and do not necessarily reflect the views of the Bank of Finland.

Laura Solanko*

Fiscal competition in a transition economy

Abstract

The paper analyses fiscal competition for mobile capital between identical regions in a transition country. A framework similar to Keen-Marchand (1997) is used to analyse welfare effects of regional competition. It is shown that in very early transition when the share of the old sector is overwhelming, consumers in a transition economy may be better off in a competitive equilibrium. The decision-makers, however, would prefer to coordinate their fiscal policies.

Keywords: tax competition, fiscal competition, transition

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1 Introduction

The majority of the literature on tax competition concludes that the tax rates on mobile factors in an uncoordinated equilibrium tend to be too low compared to a first-best unitary (coordinated) solution. This leads to excessively low revenues and thus, from the welfare point of view, an excessively low level of public expenditure in the equilibrium. Additionally, fiscal competition may affect the composition of the public goods provided by the regions. Keen-Marchand (1997) show that, in the presence of mobile capital, fiscal competition tends to lead to over-provision of public inputs in infrastructure and under-provision of items that directly affect consumer welfare such as social services. In the classic framework of fiscal federalism, this clearly is an additional welfare loss resulting from fiscal competition. Thus, there seem to be strong arguments for the coordination of both tax rates and regional expenditure in the presence of competition for mobile factors. Nevertheless, decentralization, especially in the first half of the 1990s, was actively promoted as a necessary policy choice for most transition economies in Central and Eastern Europe and the former Soviet Union and portrayed as a means of getting rid of the excessive centralization and politicization of economic life. While the policy discussion at international levels may have recently shifted to the institutional requirements of successful decentralization, the debate over the potential benefits of decentralization is far from concluded.

I argue in this paper that fiscal competition may be at least partially beneficial in the case of a transition country starting from a centrally planned socialist economy. Indeed, Qian and Roland (1998) recently proposed that, in a transition economy, decentralization combined with regional competition for mobile capital reduces subsidies to local state enterprises, and thus is potentially beneficial for the transition process. This advantage comes at the cost of allocative distortion, however, because it tends to encourage a scarcity of local public goods and overinvestment in infrastructure (the familiar Keen-Marchand result). The model used in their paper, however, differs from the widely used fiscal federalism framework.

The analysis here is based on the well-known Zodrow-Mieszkowski (1986) model of capital income taxation as interpreted by Keen-Marchand (1997).[1] By adding certain distinctive transition features to their standard model, I hope to shed light on the interaction of regional competition and the transition process. My aim here is essentially to introduce two specific transition features into a model which is simpler and better conforming to the fiscal competition literature than that of Qian-Roland (1998) and then determine whether competition in such a framework is welfare-improving. This would also affirm Qian-Roland's argument as to the benefits of decentralization in a "standard" fiscal federalism framework under specific conditions.

As a starting point for defining transition, I use Blanchard's (1997) view of transition as a reallocation of an economy's resources (capital and labor) from the state to private-sector enterprises. Blanchard applies a simple two-sector model, wherein both sectors have equal production functions but the goods produced by the state sector are of low quality. In my model, the two sectors of an economy in transition use the same inputs and produce an identical good, but the productivity of the old, state sector is lower than that of the new, private sector. I further assume that in pre-transition allocation, a careful mix of taxes and subsidies encouraged state firms to produce mediocre goods and consumers to buy them. Transition here is seen as the elimination of these taxes and subsidies (liberalization and removal of subsidies). Since the private sector is by definition more competitive, full transition will *ceteris paribus* result in an equilibrium where only a private good is produced.

The second transition feature in my model considers the objectives of decision-makers. I assume that decision-makers exercise a degree of control over state-sector enterprises and they own the rents generated in those enterprises. Giving decision-makers a personal stake in blocking transition assures that a complete transition will not occur overnight. Here, I assume that the actions of decision-

[1] Other models with two types of public goods, but focusing on slightly different problems, include Beck (1983), Clarida-Findlay (1994), Kondrad (1995) and Bayindir-Upman (1998).

makers will be neither fully benevolent nor behave as Leviathans. Instead, they maximize a weighted average of consumer welfare and their private benefit. This assumption about decision-makers differs from Edwards-Keen (1996). There is a rich body of empirical literature on the actual behavior of regional decision-makers. For example, privatization moves in CIS countries often led to insider ownership of former state enterprises. In numerous instances, local politicians and managers siezed control of privatized former state enterprises ("grabbing hand privatization"[2]).

Much of this discussion applies to the Russian Federation, by far the largest European transition country and constitutionally a federation consisting of 89 regions. Certainly, there are examples of competition among Russia's regions, especially in attracting foreign direct investment (FDI).[3] Nevertheless, the features of insider ownership, slow restructuring and not fully benevolent decision-makers are common to all transition countries. Other former Soviet Union (FSU) countries such as Ukraine and Kazakhstan face regional problems very similar to Russia's.

Section two discusses details of the transition-specific features of the model.

Section three presents my basic model of tax competition in a transition economy. Opening up the borders for regional competition, as expected, leads to lower levels of taxation and consequently lower levels of regional public goods. However, lowering capital taxes increases the profitability of private sector and thus decreases production and rents in the state sector. Since private sector production is more efficient, regional tax competition has an additional benefit – an efficiency gain from transition. When analyzing the welfare effects of a common increase in capital taxation, the loss of the efficiency gain together with decreasing private consumption must be weighted against the benefits of increased public goods provision. I show that the direction of a welfare change from such a coordinated

[2]The notion of the grabbing hand was introduced by Frye-Shleifer (1997) to characterize a badly organized government consisting of several independent bureaucrats pursuing their own economic and political agendas.

[3]See e.g. Solanko-Tekoniemi (1999) and Kolomak (2000).

policy decision may be positive or negative depending on the decision-maker's preferences and the stage of transition. In very early transition, for example, the share of the new sector is negligible so a welfare change resulting from a common increase in capital tax may be negative.

In the enlarged model analyzed in section four, the public goods provided by regional governments are redefined as a social public good and an infrastructure good. The public infrastructure good mostly benefits the new sector. If regions engage in competition for mobile capital by offering higher levels of infrastructure goods, the familiar Keen-Marchand result emerges. Increased infrastructure spending will cause an additional benefit via increased share of private production in the economy. In this case, the direction of a welfare change from a coordinated policy change is found to be dependent on the decision-maker's preferences and the stage of transition.

Section five concludes.

2 Modeling a transition economy

Tax competition models are usually built on assumptions of perfectly competitive markets, benevolent decision-makers and a single, known production technology (i.e. identical firms) in every region. While these are convenient generalizations, such assumptions can be particularly misleading in the case of transition economies.

An essential aspect of the Soviet economy and Soviet society was the excessive politicization of decision-making. All decisions on pricing, product lines, subsidies, raw materials, licences, etc. were made by state bureaucrats and party officials. Not surprisingly perhaps, Russian insider privatization did nothing to promote the depoliticization of economic life. Shleifer (1997) notes that the failure of government to make the transition from a communist state to an institution that supports a market economy may explain why Russia's economic performance during transition has been much weaker than that of e.g. Poland. A similar con-

clusion is reached by Johnson-Kaufmann-Shleifer (1997). Indeed, much of the recent literature on the Russian transition experience points to the fusion of regional economic and political decision-making as a main cause of the country's dismal economic performance[4]. As Boycko-Shleifer-Vishny (1995, p. 41) put it: "*Of the politicians who grabbed control rights, none got more under Gorbachev, and subsequently Yeltsin, than local officials.*"

It seems reasonable then to assume that decision-makers enjoy close ties with regional state sector enterprises. In my model, I assume that regional decision-makers are *de facto* owners of the state sector enterprises and that they divert net rents from state enterprises for their own use. Progress in transition may strip regional decision-makers of their private benefits. While this assumption seems well in line with empirical observations of transition countries, and Russia in particular, it is a purely exogenous assumption. Very little, if any, formal modeling has been done on decision-maker preferences in a transition environment, and certainly this seems a tempting area for further research. To my knowledge, only Qian-Roland (1998) have attempted to offer a framework combining transition and regional competition.

The model presented here can also be seen as a greatly simplified version of Qian-Roland (1998) analyzed in the framework of Keen-Marchand (1997). Note, however, that the Qian-Roland (1998) model has its origins in a completely different framework than Keen-Marchand (1997). In my model, the moral hazard problem – so central in Qian-Roland (1998) – is omitted. I assume all state sector enterprises to be identical and consequently every firm in that sector receives an equal capital subsidy. As that subsidy has to be paid by the new sector firms for the government's budget constraint to hold, I have modeled the subsidy as a capital tax on the new sector.

Following the Keen-Marchand (1997) framework, I assume a single representative consumer for every region. This consumer owns all capital and also owns

[4]See e.g. Hanson-Bradshaw (2000), Shleifer-Treisman (2000), Treisman (1999), and Desai-Goldberg (2000).

the rents generated in the new sector. In deciding the regional public goods-tax mix, the decision-maker maximizes a weighted average of consumer welfare and his private benefit, i.e. state sector rents. In contrast to both Keen-Marchand (1997) and Qian-Roland (1998), these decision-makers are not fully benevolent, but also do not behave like Leviathans.[5] Moreover, a close look at the production structure of a transition economy may provide further justification for my assumption on decision-maker preferences.

The major reallocation of an economy's resources from old sectors to new ones charterizes the transition from a state-owned and state-controlled economy to a market-based economy . In most Soviet-sphere economies, large-scale heavy industries received disproportionately large amounts of resources while small-scale service and consumer goods sectors were seriously underdeveloped. Because the means of production were public property, private businesses were nonexistent. Thus, reallocation in the ownership structure of these economies has been an important part of the transition process.

Taking transition as a reallocation of an economy's resources from state (or old) to new (or private) sector along the lines of e.g. Blanchard (1997), we assume both sectors of the economy produce an identical good used for public and private consumption. In this simple model, the economy has one input – fully mobile capital. The difference between the two sectors, therefore, represents the difference in productivity. New sector is assumed to be more productive, so that $F^N\left(K^N\right) = \beta F^S\left(K^S\right)$, $\beta > 1$[6].

Higher productivity in the private (or new) sector of the economy is a sign of successful restructuring (i.e. better management, internal reorganization and education), or new business practices (i.e. advertising, marketing, new products and product differentiation). Instead of restructuring, the state (old) sector enterprises retain their old habits such as close relations with the regional administration and

[5] On Leviathan models and regional competition, see Edwards-Keen (1996).

[6] A similar formulation with higher marginal productivity of capital in the private sector is used in e.g. Castanheira-Roland (2000).

old product lines.[7]

Although I refer to "old state sector" and "new private sector" throughout this paper, the key issue here is not ownership structure. As seen in most CIS countries during the 1990s, reallocation of the ownership structure (i.e. privatization) alone does not necessarily lead to improved business practices. Djankov-Murrell (2000) offer an excellent and thorough review of empirical restructuring literature, concluding among other things that the effect of privatization on firm performance is significantly less important in CIS than in non-CIS transition countries. The greater share of insider owners combined with weak institutions in the CIS are a main reason for this difference. Russian voucher privatization was the prime example of a privatization scheme that led to insider ownership and continued lobbying for government subsidies and government orders[8].

In this model, the new, more efficient sector may include new private firms, as well as restructured state-owned enterprises. The old sector represents all non-restructured enterprises, privatized or not. Also a newly established firm may be grouped in the old sector when its business practices have more in common with the old sector (e.g. soft budget constraints) than the new sector.[9]

[7] This assumption of different productivity in the two sectors does not come from thin air. For example, Brown-Earle (2000) analyze firm performance and total factor productivity in Russia using panel data for close to 15,000 enterprises during 1992-1998. The conclude that non-state firms clearly outperform state enterprises.

[8] Boycko-Shleifer-Vishny (1995) offer a good early account of the Russian mass privatization phenomenon.

[9] One example that might help clarify the distinction between old and new sectors might be the Vyborg pulp and paper mill (VTSBK) in the Leningrad oblast. The mill was sold to foreign investors in 1997. Presently, its is nearly 100% owned by an investment firm registered in the UK. The mill was never restructured and during the recent years it has accumulated massive tax and wage arrears. In late 1999, the formal owners of the firm needed police escorts to enter the mill area, which was occupied by the worker's collective. The workers simply wanted to halt the implementation of a restructuring plan which would have included massive layoffs. The local administration sided the worker's protests as the mill not only provided the workers with job and housing, but also provided the entire community with electricity. In the categories used in this paper, VTSBK would be classified as an old sector firm, despite its private ownership.

As the model used in this paper is a static equilibrium model, in the absence of any friction, the optimal sectorial reallocation would result in an instantaneous shift from old to new sector production as soon as transition started.[10] The old sector would vanish, thus maximizing consumer welfare. The friction preventing this instantaneous shift from occurring in my model is the regional decision-maker with private interests in old-sector economic activity. If our decision-makers were wholly benevolent, this simple static model would fail to capture the reallocation of resources from the old to the new sector.

3 Capital tax competition in a transition economy

3.1 The basic model

We consider a federation consisting of several small, identical regions. Federal power is wholly passive in this model. Decisions about tax levels and provision of regional public goods are made only on the regional level. Under this assumption, issues related to vertical tax competition are excluded. Every region has two types of firms: old (state) and new (private).[11] Both sectors use mobile capital to produce a single consumption good and by definition private sector production is more efficient, i.e. $F^N(K) = \beta F^S(K)$, $\beta > 1$.

The stock of capital used in production is fixed at the national level, but completely mobile among regions. Every region is assumed to be so small that no region can alone influence the net return on capital. Because capital is mobile, any marginal increase in the tax level induces a marginal outflow of capital from that region. The assumption of a fixed capital stock does not necessarily match

[10] For an overview of dynamic models focusing on the optimal speed of sectoral reallocation, see Roland (2000) chapter 5.

[11] State sector variables are marked with superscript S (R^S, K^S, F^S), while new sector variables with superscript N. Subscripts stand for derivatives.

empirical observation, but it is still reasonable enough to assume that capital goods used in production are more mobile within countries than between them. The role of FDI in the economy has been notably modest in the case of Russia and other CIS countries.

Unlike the Keen-Marchand (1997) model, we are not particularly interested in analyzing the effects of competition and coordination on the labor supply and real wages (nominal wage minus taxes).[12] Since adding a fixed labor supply to the model does change any fundamental results, only a one-factor model is presented.[13] Additionally, in the majority of transition countries – as opposed to Western European countries – taxes on labor income are negligible sources of government income, while VAT and taxes on entrepreneurial activities account for a substantial share of government revenues[14].

Since all regions are assumed to be identical, we concentrate on a representative region. Regions tax rents (profits) at rate t and private sector capital at rate T to finance provision of a single regional public good. Thus, the enterprises of the new sector are taxed more heavily than those in the old sector.

[12] Empirical observations of Russian labor markets confirm that labor is rather immobile between regions. Friebel et al (2000) and Grosfeld at al (1999) discuss the dynamism of Russian labor markets. The assumptions of immobility and full employment together would imply that a decrease in employment in one sector is compensated by an equal increase in employment in the other sector $dL^N = -dL^S$ within every region.

[13] Matsumoto (2000) shows, however, that when both capital and labor are fully mobile, the basic results of the Keen-Marchand (1997) model do not necessarily hold.

[14] See Ebrill-Havrylyshyn (1999) for FSU and Baltic countries. Tanzi-Tsibouris (2000) note, however, that payroll taxes go directly to extra-budgetary funds and are thus not shown in federal or regional budgets. These account for as much as a quarter of general government revenues in some transition countries, including Russia.

3.1.1 The firms

Firms in both sectors behave competitively and maximize rents (profits) $\bar{R} = R^S + R^N$.[15] Capital markets are perfectly competitive. Capital is fully mobile between sectors and regions, but fixed in supply at the national, or federal, level.

Rents in the two sectors are

$$R^S = F^S(K^S) - \rho K^S \tag{1}$$

$$R^N = F^N(K^N) - (\rho + T)K^N \tag{2}$$

We assume that the production technology F in both sectors is strictly concave in capital. This implies the usual marginal conditions $F_K > 0, F_{KK} < 0$ for both sectors. The demands for capital $K^S(\rho)$, $K^N(\rho + T)$ are dependent on the net return on capital. Fully mobile capital earns a net return ρ in every sector and every region, so in equilibrium we find that:

$$\rho = \beta F_K^S - T = F_K^S \tag{3}$$

The above condition may be treated as two distinct capital market equilibrium conditions. First, as the net return on capital is given, the equilibrium of a representative region is characterized by $\rho = F_K^N - T$. Second, the condition that $\beta F_K^S - T = F_K^S$ states the allocation of capital between the two sectors within every region. The capital market equilibrium condition (3) also indicates the level of capital taxation, $T = F_K^S(\beta - 1)$. This can equivalently be viewed as a subsidy paid to the old sector to keep it in business.

From the perspective of a small region, an increase in capital tax in one region does not affect the net return ρ in the federation. On the contrary, it only induces an outflow of new sector capital from that region. From the point of view of the

[15] The existence of rents in a transition economy should not come as a suprise. The source of rents in the economy could be e.g. relational capital or land to which enterprises have de facto control rights.

nation, it is not the net return but the capital stock that is fixed. When regions can decide on a uniform increase in capital tax rate, the net return on capital is affected. As a capital tax is only imposed on capital used in the new sector, a common increase in T tips the balance between new and old sectors in favor of the old sector. Since the amount of capital is fixed at the national level, for coordinated tax changes $K_T^{N*} = -K_T^{S*}$[16]. Using (3) and the definition of rents in the two sectors (1) and (2), we obtain the following[17]:

Table 1

Non-cooperative case (small region)	Cooperative case (federal action)
$R_T^N = -K^N < 0$	$R_T^{N*} = -K^N (1 + \rho_T^*) < 0$
$R_T^S = 0$	$R_T^{S*} = -K^S \rho_T^* > 0$
$K_T^N = \frac{1}{F_{KK}^N} < 0$	$K_T^{N*} = \frac{1}{(1+\beta)F_{KK}^S} < 0 \ \forall \rho$
$K_T^S = 0$	$K_T^{S*} = -K_T^{N*} > 0$
$\rho_T = 0$	$\rho_T^* = F_{KK}^N K_T^{N*} - 1 = \frac{-1}{1+\beta} < 0$
$\bar{R}_T = -K^N$	$\bar{R}_T^* = -K^N + \bar{K}\frac{1}{1+\beta} < 0$

None of the regions in this federation are linked by trade. Everything produced in a region is consumed there, and the income on capital is consumed in the region where it was earned. This assumption assures that public good provision in one region has no spillovers to others. The total production within one region is

[16] We denote the change variables in the coordinated case with an asterisk*.

[17] The straightforward derivation of results for the non-cooperative case should be apparent. Results for the cooperative case are provided in the appendix.

$F^S + F^N$. Thus, the resource constraint of a representative region is

$$\bar{F} = F^S + F^N = (1+\beta)\, F^S = C + G \tag{4}$$

3.1.2 The consumer and the decision-maker

There is a representative consumer in each region with preferences $U(C, G)$. The consumer's utility depends on two components: C denotes consumption of a composite good and G is pure regional public good. The consumer's utility function is twice differentiable and both C and G are assumed to be normal goods. The consumer's utility is maximized with respect to the consumer's budget constraint

$$C = M = (1-t)\, R^N + \rho\bar{K} \tag{5}$$

All capital in this federation is owned by its citizens. They are entitled to capital income $\rho\bar{K}$ and to net rents from economic activity in the new sector in their home region $(1-t)\, R^N$. It is clear that for a representative consumer M is essentially lump sum income. Thus, the indirect utility function for the representative consumer is

$$V = V(G, M) = V(G, (1-t)\, R^N + \rho\bar{K}) \tag{6}$$

The decision-makers (politicians) in every region exert a degree of control on the state sector and receive a private benefit (net rents) from production in that sector.

Thus, this not fully benevolent decision-maker seeks to maximize a weighted average of indirect consumer utility V and his private benefit $\Phi = (1-t)R^S$. The decision-makers then maximize W

$$W = \alpha V + (1-\alpha)(1-t)R^S \tag{7}$$

with respect to regional tax instruments T, t and regional public good provision G subject to public sector's budget constraint

$$G = t\bar{R} + TK^N. \tag{8}$$

where $\bar{R} = R^S + R^N$.[18] Although decision-makers retain rents from the state sector, we assume the state sector pays the rent tax. In most CIS countries, taxes on business activity rather than on income or consumption constitute the basis of the tax system. Additionally, large state enterprises often provide their locality and sometimes even their region with a large variety of public services.

The regional government cannot borrow, so its budget constraint will hold with equality. We further assume that rents cannot be fully taxed, giving the additional constraint $t \leq \bar{t} < 1$ that regional politicians need to take into account. As I show below, efficiency requires that rents are fully taxed, which is rarely the case in real life. The fact that $t < 1$ forces decision-makers to use the capital tax in financing public good provision.

Combining (5) and (8), we rewrite the resource constraint (4) as

$$\bar{F} = \rho \left(K^S + K^N\right) + TK^N + R^S + R^N \tag{9}$$

The changes in the level of total production caused by a unilateral and a common change in capital tax are $\bar{F}_T = (\rho + T) K_T^N$ and $\bar{F}_T^* = TK_T^{N*}$, respectively. Using the results in Table 1, we see that $\bar{F}_T < \bar{F}_T^* < 0$. Thus, there is always a negative relation between the level of capital taxation and total production in a region. If, for some exogenous reason, capital moves from the old to the new sector within a region, total production in that region would be increased by $(\beta - 1) F_K^S \Delta K$, where ΔK is the amount of capital moving. Other things being equal, as transition (interpreted here as reallocation of resources i.e. capital) from old to new sector proceeds, total production increases. I call this the efficiency gain from transition. In a one-sector model such as Keen-Marchand's (1997), a common change in capital tax does not change the production level nor rents in the economy. Unlike standard tax competition models, entrepreneurs in this model may always switch back to the business practices of old sector (which will

[18] An alternative formulation for W would be one where decision-maker's private benefit only depends on the level of production in the old sector, i.e. $\Phi = (1 - \alpha) K^S$. Some consequences of such a formulation are mentioned below.

cause a small decrease in total production).

The results of my model will naturally depend on the exogenously given weight on consumers' utility α so that it is the decision-maker's preference to impose a positive capital tax only on the new sector.[19] The greater the productivity difference β , the greater the welfare loss from subsidizing the state sector (i.e. not imposing capital tax T on the old sector), and consequently α is smaller. If an equivalent capital tax T is imposed on both sectors, all capital from the old sector will move to the new, more productive sector and the old sector will cease to exist. Such a move, when made by all regions simultaneously, will increase both total production and government tax revenue.[20] What then prevents such shifts?

The parameters α and $1-\alpha$ are intended to capture some reflections from transitional reality. As discussed, regional leaders have their private interests at stake in a transition. They may be politically dependent on support from regional economic elite, usually managers of possibly privatized, but more often unrestructured, former state-owned enterprises (SOEs). As major employers, state sector enterprises can wield considerable lobbying power at the regional level. While it is clear that ending state sector activity will benefit all consumers, the transition decline may be considerable and the transition is likely to have temporary effects on different groups of consumers. As our model is not dynamic, these issues are ignored and only appear through the unusual formulation of the decision-maker's objective function.

[19] This assumption of zero capital tax in the state sector has its origins in non-benevolence of decision-makers. As regional politicians get private benefit from state sector production, a capital tax on state sector would be lower in equilibrium than the capital tax on the new sector. The results remain unchanged as long as the difference between the two capital tax rates remain large enough to keep the old sector alive. From (5) we note this has to be $T^N - T^S = F_K^S(\beta - 1)$. To simplify the model, we assume a zero tax rate instead of a lower capital tax on the state sector.

[20] If all regions agree to simultaneously impose an equivalent capital tax T also on the state sector, total production will increase by $(1-\beta)F^S$ and tax revenue will rise by TK^S.

In the following subsections, I analyze consumer welfare under two regimes. In one, regions compete with each other to attract mobile capital. In the other, regions coordinate their tax policies.

3.2 Non-cooperative equilibrium

The optimization problem of a typical regional government in non-cooperative situation is to maximize Lagrangean (10) with respect to government policy variables G, T, and t.

$$\begin{aligned} L &= \alpha \left\{ V \left[G, (1-t) R^N + \rho \bar{K} \right] \right\} + (1-\alpha)(1-t) R^S \\ &\quad + \mu \left(T K^N + t \bar{R} - G \right) + \lambda (\bar{t} - t) \end{aligned} \tag{10}$$

The first two terms are the weighted average of indirect consumer utility and decision-maker's private benefit, the third the government's budget constraint, and the fourth a constraint on pure profit taxation. As proven below, the fact that the last constraint is binding confirms that the capital tax is positive. The resource constraint (9) holds according to Walras' law. The first-order conditions for a non-cooperative equilibrium can be written as follows

$$G: \ \alpha V_G - \mu = 0 \tag{11}$$

$$T: \alpha (1-t) V_M R_T^N + \mu K^N + \mu T K_T^N + \mu t \bar{R}_T + (1-\alpha)(1-t) R_T^S = 0 \tag{12}$$

$$t: \ -\alpha V_M R^N - (1-\alpha) R^S + \mu \bar{R} - \lambda = 0 \tag{13}$$

where M denotes the lump-sum income component of the consumer's indirect utility. Using (11) in (13), and then rearranging, we obtain

$$(V_G - V_M) = \frac{A}{\alpha R^N} > 0 \tag{14}$$

where $A = \lambda + R^S [(1-\alpha) - \alpha V_G] > 0$ when $\lambda + R^S (1-\alpha) > \alpha V_G R^S$. However, it is by no means obvious that $A > 0$. Surprisingly, competition may lead to an equilibrium where public goods are in fact overprovided. As one might expect, there are two forces at work that tend in opposite directions. As in classical frameworks, fiscal competition tends to lower capital tax rate T and consequently the level of G. But, as it is in the decision-maker's private interest to keep rent taxes t low, the concern for consumer's welfare may encourage him to raise T to provide at least some public good G. Thus, it is possible that for large values of α the decision-maker is prone to use the distortive tax T excessively, and thereby establish an equilibrium where $V_G < V_M$.

Our interest here centers on the case where the public good is underprovided, so we assume that the Lagrange multiplier λ is large enough and the weight on consumer utility α small enough to allow for $\lambda + R^S (1-\alpha) > \alpha V_G R^S$.[21] Thus, in the non-cooperative equilibrium of our model, the regional public good is underprovided in the sense that the consumer's marginal willingness to pay for G exceeds the marginal cost of producing it.

Given the above assumptions, the equation (14) states that, in a non-cooperative equilibrium, capital tax T is set too low. As discussed above, there is a negative relationship between T and F^N indicating that in a non-cooperative equilibrium more is produced in the new sector. Thus, despite leading to underprovision of public goods, tax competition promotes transition. The interesting question taken up in the following subsection is whether under certain conditions the efficiency gain from transition, i.e. increased private consumption, is large enough to compensate for the disutility of insufficient public goods provision.

Finally, using (11) and the results in Table 1 in (12), and rearranging, we obtain the following first-order condition for T characterizing a non-cooperative equilibrium

$$K^N (V_G - V_M)(1-t) = -V_G T K_T^N \tag{15}$$

[21] When $\lambda = 0$, (14) is positive as $\alpha(1+V_G) < 1$. The condition holds if $\alpha \leq \frac{1}{2}$. When $\lambda > 0$, the value of α guaranteeing $(V_G - V_M) > 0$ is naturally $\alpha \leq \frac{1+\lambda}{2}$.

From (15), we note that

$$T = \frac{-K^N (V_G - V_m)(1-t)}{V_G K_T^N} \tag{16}$$

If $t = \bar{t} = 1$, the capital tax is assumed to be zero.[22] Under Keen-Marchand (1997), one could then prove that in a non-cooperative equilibrium $V_G = V_M$. In my model, however, this is not the case because the decision-makers are the effective owners of state sector firms. Even if $\lambda = 0$ indicating that rents could be fully taxed, $(V_G - V_M)$ would not necessarily be zero, so the equilibrium would not be first-best. The reason is that the ownership structure in this setting results in too little private consumption. Compared to the Keen-Marchand (1997) model, the level of public good provision has not changed but consumers have less resources for private consumption at their disposal. Thus, even if rents would be fully taxed and capital tax would be zero, $(V_G - V_M)$ may be positive or negative.

From $R_T^S = 0$, we reach the straightforward conclusion that in a non-cooperative (competitive) setting the regional decision-makers have no tools to increase their private benefit $(1-t) R^S$ via the capital tax. Unlike the Keen-Marchand (1997) framework, the additional distortion emerges from the decision-maker's private interest in lowering the level of rent taxation.

The findings are summarized in Proposition 1 below.

Proposition 1 *When decision-makers own state sector rents, in a symmetric non-cooperative equilibrium:*

a) public goods may be over- or underprovided.

b)If $t = 1$, capital tax T will be zero. This does not however, automatically lead to the first-best equilibrium.

3.3 Common increase in the capital tax

Assuming that in the non-cooperative equilibrium public good is underprovided, a commonly suggested remedy is to centralize all or some parts of fiscal policy-

[22] From (15), one notes that $T = \frac{-K^N (V_G - V_m)(1-t)}{V_G K_T^N} = 0$ if $(1-t) = 0$.

making. A common increase in the capital tax used to increase the provision of the public good should be welfare improving. Centralization may be interpreted as delegating decision-making to one national decision-making body with preferences identical to those of regional authorities. Identical results are naturally attained if centralization is seen as a fully coordinated action made simultaneously by all individual regions. In the following, I apply the notions of common or coordinated policy change to characterize centralized decision-making.

In the one-sector Keen-Marchand (1997) model, a common increase in T lowers ρ by the same amount in every region and rents are unaffected. Consequently, welfare improvement is $\frac{dV}{dT} = K\left(V_G - V_M\right)$. If the common increase in T is made starting from the non-cooperative equilibrium, by (14) $\frac{dV}{dT} > 0$. In the two-sector economy we are interested in, the effects of a common increase in T are less straightforward.

A coordinated increase in T ensures that no capital K^N will move to other regions. Instead, inside every region some K^N is likely to move back to the state sector practices. Even though the total amount of capital in a region will not change, the relative share of the new sector is likely to fall. This will lead to a drop in total production equivalent to $\bar{F}_T^* = TK_T^{N*}$.

To analyze the effects of a common increase in T on welfare, I follow the technique used in the Keen-Marchand (1997) model. As the common increase in T is used solely to finance some additional G, one may plug the government budget constraint (8) into the consumer's indirect utility function V to get

$$V = V\left(TK^N + t\bar{R}, (1-t)\,R^N + \rho\bar{K}\right) \tag{17}$$

The common increase in T used to provide additional G has the following effect on consumer utility[23]:

$$\begin{aligned} \frac{dV}{dT^*} &= V_G\left(K^N + TK_T^{N*} + t\bar{R}_T^*\right) + V_M(1-t)R_T^{N*} + V_M\rho_T^*\bar{K} \\ &= (tR_T^{N*} + K^N)(V_G - V_M) + \rho_T^* V_M K^S\,(1-t) + V_G T K_T^{N*} \end{aligned} \tag{18}$$

[23] The calculations are found in appendix B.

Using the results from Table 1, we note that $K_T^{N*} = \frac{\beta}{1+\beta} K_T^N$, the outflow of capital from the new sector is smaller in the coordinated case than in non-coordinated setting.[24] Multiplying (15) by $\delta = \frac{\beta}{1+\beta}$ we get

$$V_G T K_T^{N*} = V_G \bar{F}_T^* = -\delta \left(V_G - V_M\right) \left(t\bar{R}_T + K^N\right) \tag{19}$$

Since we are interested in marginal changes in consumer utility caused by a marginal common increase in capital tax starting from non-cooperative equilibrium, we may suppose that the first-order conditions of the non-cooperative equilibrium are valid. Using (19) in (18), and rearranging, we obtain

$$\frac{dV}{dT^*} = -\rho_T^* \left[\left(V_G - V_M\right) \left(K^N + tK^S\right) - V_M \left(1 - t\right) K^S\right]. \tag{20}$$

The first term on the right-hand side is always positive and the second term is always negative. The direction and the magnitude of the welfare change characterized by (20) is likely to depend on the relative shares of the old and new sectors in the regional economy. We alter the standard effect $\bar{K}\left(V_G - V_M\right)$ obtained by Keen-Marchand (1997) in our model in three significant ways.

First, the amount of increase in consumer's welfare depends on the relative shares of old and new sectors in the region's economy. If the old sector is the dominant type, the volume of total production is relatively low and the economy is said to be in "early transition."[25] If the opposite is true, the regional economy is said to be in "late transition." Transition is "over" when $K^N = \bar{K}$, and the result in (20) reduces to $-\rho_T \bar{K}\left(V_G - V_M\right) > 0$. In very early transition, when the new sector is negligible, (20) reduces to $-\rho_T^* \bar{K}\left(tV_G - V_M\right)$, which is positive only for very large t values. As the tax collection capacity in transition countries is known to be less than perfect due to e.g. poor tax administration and massive tax evasion, the interesting case is where the constraints on rent taxation are severe

[24] $K_T^N = \frac{1}{\beta F_{KK}^S} = \frac{1+\beta}{1+\beta} \frac{1}{\beta F_{KK}^S} = \frac{1+\beta}{\beta} \frac{1}{1+\beta F_{KK}^S} = \frac{1+\beta}{\beta} K_T^{N*}$

[25] As the model here is static, the notions "early" and "late" transition do not refer to any specific time horizon. Instead, they refer to a stage in transition that may or may not last for a long time. I am grateful to Prof. Sakari Uimonen for pointing out this fact.

so that $tV_G < V_M$. The change in consumer's welfare certainly increases as $\frac{K^N}{\bar{K}}$ increases, so when $\frac{K^N}{\bar{K}}$ is very small $\frac{dV}{dT^*}$ may actually be negative.[26]

Second, due to the productivity difference, there is an additional multiplier $-\rho_T = \frac{1}{1+\beta} < \frac{1}{2}$ when $\beta > 1$.[27] The larger is the productivity difference between the two sectors, the smaller is $-\rho_T$ and consequently the smaller is the increase in consumer's utility characterized by (20). Even in late transition the welfare improvement resulting from a common increase in T is smaller than in the classical Keen-Marchand type economy.

Third, the second term on the right-hand side of (20) is a consequence of the ownership structure which differs from the Keen-Marchand framework.[28] In our model, any common marginal increase in T leaves consumers $-V_M (1-t) R^S$ worse off than in an economy where consumers are entitled to net rents from all economic activity in their region. Whether such a coordinated move is welfare-improving clearly depends on the level of rents and the amount of capital remaining in the old sector.

The change in a decision-maker's objective function due to a small common increase in capital tax rate is

$$\frac{dW}{dT^*} = -\alpha\rho_T^* \left[V_G \left(K^N + tK^S\right) - V_M \bar{K}\right] + (1-\alpha)(1-t) R_T^{S*} \tag{21}$$

The first term in the right-hand side is (20) rearranged and the second term is always positive as long as state sector exists.[29] The larger is the state sector, the bigger is the benefit from a common increase in T for decision-maker, indicating that decision-makers benefit most from coordination in early transition. Thus,

[26] If $t = 1$, the welfare change given in (21) is always the same irrespective of the stage of transition.

[27] In a Keen-Marchand one-sector economy $\rho_{T^*} = 1$. If productivity in the both sectors is equal $\beta = 1$. However, if the state sector remains untaxed $\rho_{T^*} = \frac{1}{2}$.

[28] In another paper, Solanko (2001), I show that when decision-makers only get an immaterial benefit from continued production in the state sector ($\Phi = (1-\alpha) K^S$) while consumers are entitled to all net rents in the economy, the welfare change due to a common marginal increase in capital tax rate is $-\rho_T^* \left[(V_G - V_M)\left(K^N + tK^S\right)\right]$ instead of (20).

[29] The second term may alternatively be written as $-\rho_T (1-\alpha)(1-t) K^S > 0$.

it is possible that in early transition a common marginal increase in T would be harmful for the consumer but beneficial for the decision-maker. Rearranging (21) gives

$$\frac{dW}{dT^*} = -\rho_T^* \left[\alpha V_G \left(K^N + tK^S\right) + (1-t) K^S \left((1-\alpha) - \alpha V_M\right)\right] \tag{22}$$

The first term inside the square brackets is always positive whereas the second one is positive if $\alpha < \frac{1}{1+V_M}$.[30] For small values of α, it may still be in the interests of the regional decision-makers to coordinate their actions and increase the capital tax rate even if consumers would in fact prefer a coordinated decrease in the tax rate. Unless α is close to unity is unlikely that $\frac{dW}{dT^*}$ would ever turn negative. This indicates that a coordinated decrease in T is never likely to occur.

The results are summarized in Proposition 2 below.

Proposition 2 *When decision-makers own state sector firms and rents from that sector accrue to them, and starting from a symmetric non-cooperative second-best equilibrium where public good G is underprovided:*

a) A common increase in T used to finance some additional G may decrease consumer welfare in early transition.

b) A common increase in T may occur even in early transition as it always increases state sector rents and consequently the private benefit of decision-makers.

Part a) of the proposition states that if we assume $t \leq \bar{t}$ to be such that $(V_G t - V_M) < 0$, the increase in consumer utility due to a small common change in T may be negative. In early transition, when $\frac{K^N}{K}$ is large, the negative effect $-V_M \bar{K}$ is likely to dominate and a common increase in T will decrease consumers welfare. This result bears similarities to the findings of Qian-Roland (1998). They conclude that regional competition is beneficial as it forces SOEs to restructure and increases efficiency of the economy overall. In this framework, competition drives capital tax rates down and promotes reallocation of capital from old to the new sector.

[30] A sufficient, but not necessary, condition for this inequality to hold is $\alpha < \frac{1}{2}$.

It seems that the key to the somewhat conflicting results of Qian-Roland (1998) and standard tax competition models lies in decision-maker preferences. When a politician cares about the rent level in the inefficient old sector, tax competition may – at least in early transition – improve the consumer's welfare. When the allocation of economy's resources from state to private sector is close to final, the common increase in T will in this framework increase social welfare. Thus, as we approach a one-sector "normal" economy, we are more likely to see the Keen-Marchand (1997) type welfare effect.

Part b) of the proposition stems from the fact that $R_T^{S*} = -\rho_T^* K^S > 0$. While this is self-evident from the model definition, it nevertheless has interesting implications. As regional decision-makers are stakeholders in state sector enterprises, they have a private incentive to delay transition by coordinating their tax policies and possibly overtaxing the new sector. Even if consumers prefer a coordinated decrease in T, coordination may result in an increase in the tax rate. In such a situation, the consumers clearly prefer the competitive equilibrium to coordination. Thus, under certain conditions, regional competition may both promote transition and be welfare-improving for the consumers i.e. citizens of the federation.

However, one should be especially cautious when deriving any policy-relevant conclusions from proposition 2. Starting from a centrally planned situation, creating conditions for regional competition has to include decentralizing fiscal policymaking to some extent. However, it is far from obvious that decentralizing decision-making leads to regional competition when decision-makers are not offered new incentives. Even if, contrary to the results of classical tax competition models, competition benefits the majority of the population, the decision-makers in a transition country may be prone to coordinate their tax decisions as much as possible. Further, if decision-makers can successfully coordinate their tax policies, the result may be an equilibrium with excessively high capital tax rates.[31]

[31] The first-order conditions (11) and (13) remain intact. With respect to T instead of (12) they are

$$\alpha V_m (1-t) R_T^{N*} + (1-\alpha)(1-t) R_T^{S*} + \mu T K_T^{N*} + \mu K^N + \mu t \bar{R}_T^* = 0 \tag{23}$$

4 Competition with public goods

4.1 The basic model enlarged

In the previous section the main interest was the level of public goods provision. It was shown that when decision-makers collect rents from economic activity in the old sector, competitive equilibrium in early transition may be preferred by the consumer. In this section, a model where regions compete by offering lower tax rates and infrastructure public goods along the lines of Keen-Marchand (1997) is analyzed. Our interest here centers on whether regional competition leads to overinvestment in the infrastructure public good.

As above, regions are assumed to be identical and small in the sense that no region alone can influence net return on mobile capital. In addition to the social public good G, regions provide also another, new type of public good I. The infrastructure public good I benefits especially new sector firms. This infrastructure public good may be interpreted as basic market infrastructure such as enforceable private property rights and better legal norms which are prerequisites for the new sector to emerge. For the sake of simplicity, I assume that the state sector enterprises do not benefit from infrastructure public good provision. This may be an oversimplification, but even so it seems reasonable to assume that the benefit from

Using (11) and results in the second column of Table 1, we solve for T

$$T = \frac{\alpha\left(V_G - V_m\right)\left(K^N\left(1-t\right) - t\bar{K}\rho_T\right) - \alpha\rho_T\left(V_M K^N + V_G t K^S\right) - \rho_T\left(1-\alpha\right)\left(1-t\right)K^S}{-\alpha\delta V_G K_T^N} \tag{24}$$

As expected, T is larger than in a non-cooperative equilibrium (16). Nevertheless, the tax rate is likely to be excessive from the standpoint of welfare maximization. If a decision-maker is entirely benevolent, i.e. $\alpha = 1$, T would be

$$T^{\alpha=1} = \frac{\left(V_G - V_m\right)\left(K^N\left(1-t\right) - t\bar{K}\rho_T\right) - \rho_T\left(V_M K^N + V_G t K^S\right)}{-\delta V_G K_T^N} \tag{25}$$

Compared to the equation above, the decision-maker's ability to increase his private benefit in a coordinated equilibrium increases capital tax by an additional $\frac{\rho_T(1-\alpha)(1-t)K^S}{\alpha\delta V_G K_T^N} > 0$.

new, infrastructure like public goods is greater for new enterprises than for the old sector enterprises which have a long experience of operating in an environment where such facilities did not exist.

The rents in the economy are now defined as

$$R^S = F^S(K^S) - \rho K^S(\rho) \tag{26}$$

$$R^N = F^N(K^N, I) - (\rho + T)K^N(T, I, \rho) \tag{27}$$

As in the previous section, the capital markets are characterized by two conditions

$$\rho = F_K^N\left(K^N, I\right) - T \tag{28}$$

which determines the equilibrium of a representative region, and by the condition that

$$\beta F_K^S\left(K^N, I\right) + T = F_K^S\left(K^S\right) \tag{29}$$

characterizing the allocation of capital between the two sectors in our model.

As in Keen-Marchand (1997), private capital and the infrastucture public good are complements in the sense that $F_{KI}^N > 0, F_I^N > 0, F_K^N > 0$ in the private sector. In a non-cooperative setting, an increase in the provision of the infrastucture public good in one region induces an inflow of capital from other regions so that $K_I^N > 0$. Further, a marginal increase in provision of the infrastucture public good in one region increases production in that region by $\frac{dF}{dI} = F_I + F_K^N K_I^N = F_I^N + F_{KI}^N K^N + F_K^N K_I^N$. I assume non-increasing returns to scale in the infrastucture public good which implies $0 < F_I \leq 1$. A coordinated increase in I only causes some capital in the old sector to move to the new within the representative region. Using (29), we note that $K_I^{N*} = \frac{\beta}{1+\beta} K_I^N = \delta K_I^N = -K_I^{S*}$. As a coordinated increase in the infrastructure public good also affects production in the old sector, the change in total production due to a marginal common increase in I is $\frac{dF}{dI^*} = F_I + (\beta - 1) K_I^{N*} F_K^S$. In a normal, one-sector economy the

increase in total production caused by a common increase in I would amount only to F_I.

Differentiating (26) and (27) and applying the fact that $K_I^S = 0$ we obtain the following

$$R_I^S = 0$$
$$R_I^N = F_I = F_I^N + F_{KI}^N K^N$$
$$\bar{R}_I = R_I^N + R_I^S = F_I$$
$$R_I^{S*} = -\rho_I K^S$$
$$R_I^{N*} = F_I - \rho_I K^N$$
$$\bar{R}_I^* = F_I - \rho_I \bar{K}$$

As in the previous section, the regional decision-maker gets net rents from economic activity in the old sector. Thus, the decision-maker maximizes a weighted average of social welfare and his private benefit subject to the government's budget constraint and the constraint on pure rent taxation. The Lagrangean takes the following form

$$\begin{aligned} L &= \alpha \left\{ V \left[G, (1-t) R^N + \rho \bar{K} \right] \right\} + (1-\alpha)(1-t) R^S \\ &\quad \mu \left(T K^N + t\bar{R} - G - I \right) + \lambda (t - \bar{t}) \end{aligned} \tag{30}$$

where G is a social public good directly entering the consumer's utility function and I is the infrastructure public good entering the consumer's utility function only via its positive effect on the rent levels.

From the Lagrangean (30) and noting that $\bar{R}_I = R_I^N = F_I$ it is clear that the non-cooperative first-order conditions with respect to G, T and t remain the same as before (see (11), (12) and (13)). The new first-order condition for I characterizing a symmetric non-cooperative equilibrium may be written as

$$I : (\alpha V_G - \alpha V_M) t\bar{R}_I + \alpha V_G \left(T K_I^N - 1 \right) + \alpha V_M \bar{R}_I = 0 \tag{31}$$

Thus, in this enlarged model with two types of public goods the non-cooperative symmetric equilibrium is characterized by the conditions defined in the proposition 1. In summary:

a) the social public good G may be over- or underprovided,

b) if rents can be fully taxed, it will not necessarily produce the first-best equilibrium, and

c) nothing definite may be said about the level of infrastructure public good I.

4.2 Common increase in the infrastructure public good

As in the previous section, we are interested in the welfare effects of a common, centralized change in public goods provision. In this setting with two different public goods, the question brought up by Keen-Marchand (1997) arises with respect to the composition of public goods provision. Are infrastructure goods over- or underprovided in relation to the level of social public good provision in a competitive equilibrium?

Analogous to the previous section, the key differences between a competitive and coordinated settings are how a policy change affects the rate of return on capital ρ and the capital stock in the new sector K^N. Before proceeding, a closer look on the term ρ_I^*, indicating the change in return on capital due to a common change in infrastructure public good, might be helpful. Differentiating the capital market equilibrium condition $\rho + T = F_K^N\left(K^N, I\right)$ with respect to I gives

$$\rho_I^* = F_{KI}^N + F_{KK}^N K_I^{N*} \tag{32}$$

Here the change in net return on capital includes two elements. Firstly, and not surprisingly an increase in I increases productivity in the new sector. The second effect arises from the specifics of our two-sector economy: an increase in productivity in the new sector induces capital inflow from the state sector resulting in a smaller increase in the net return on capital. In a one-sector economy K_I^{N*} would be zero. Differentiating $\beta F_K^S\left(K^N, I\right) + T = F_K^S\left(K^S\right)$ with respect to I, we obtain

$$K_I^{N*} = \frac{-\beta F_{KI}^N}{(1+\beta)\, F_{KK}^S} > 0 \ \forall \rho \tag{33}$$

This second effect is not present in a one-sector model, where a common increase in any policy variable does not change the capital allocation in a federation. Combining the equations (32) and (33) above results in

$$\rho_I^* = F_{KI}^N \left(1 - \frac{\beta}{1+\beta}\right) = F_{KI}^N (1 - \beta\delta) \tag{34}$$

As $\beta\delta < 1$, (34) is positive. Consequently, the increase in ρ due to a marginal common increase in I is smaller in our model than in a Keen-Marchand type model where $K_I^{N*} = 0$. The larger the productivity difference between the two sectors, the smaller the change in net return on capital due to a change in level of infrastructure public good. The above result also helps in determining the sign for R_I^{N*}. Using $R_I^{N*} = F_I^N + F_{KI}^N K^N - \rho_I^* K^N$ and (34), we find $R_I^{N*} = F_I^N + F_{KI}^N K^N \delta\beta > 0$.

We next analyze the welfare effects of a common marginal increase in social public good provision financed solely by a decrease in provision of infrastructure public good. Using the government budget constraint

$$TK^N + t\bar{R} = G + I \tag{35}$$

we describe the consumer's indirect utility as

$$V = V(TK^N + t\bar{R} - I, (1-t)\, R^N + \rho\bar{K}) \tag{36}$$

Thus, a common increase in I financed by a decrease in G has the following effect on the consumer's utility

$$\frac{dV}{dI^*} = V_I^* = (V_G - V_M)\, tR_I^{N*} + V_M F_I + V_G \left(TK_I^{N*} - 1\right) + \rho_I^* K^S (V_M - tV_G) \tag{37}$$

The first two terms are positive, the third is negative, and at this stage nothing definitive may be said about the fourth term on the right-hand side. Since $K_I^{N*} = \frac{\beta}{1+\beta} K_I^N = \delta K_I^N$, we may write

$$\begin{aligned} V_I^* &= (V_G - V_M)\, tR_I^{N*} + \delta V_G \left(TK_I^N - 1\right) + V_M F_I \\ &\quad + \rho_I^* K^S (V_M - tV_G) + V_G (\delta - 1) \end{aligned} \tag{38}$$

As we are analyzing a marginal change in the composition of the public goods provided in a representative region starting from a non-cooperative equilibrium, we do assume the first-order conditions (11) -(14) and (31) to hold. Rearranging (31) to give $(V_G - V_M)\, t\bar{R}_I + V_M \bar{R}_I = -V_G \left(TK_I^N - 1\right)$ and using this result in (38) we get

$$\begin{aligned} V_I^* &= (V_G - V_M)\left(tR_I^{N*} - \delta t\bar{R}_I\right) + V_M\left(F_I - \delta\bar{R}_I\right) \\ &\quad + V_G(\delta - 1) + \rho_I K^S (V_M - tV_G) \end{aligned} \tag{39}$$

Using $R_I^{N*} - \delta\bar{R}_I = (1-\delta)\, F_I^N + K^N F_{KI}^N (\beta\delta - \delta) = (1-\delta)\left[F_I^N + K^N F_{KI}^N a\right]$, where $a = \beta(\beta - 1)$ and the result in (34), we rewrite (39) to obtain

$$V_I^* = (1-\delta)\left[\begin{array}{l} t(V_G - V_M)\, C + V_M F_I - V_G \\ + (V_M - tV_G)\, F_{KI}^N K^S (1-a) \end{array}\right] \tag{40}$$

where $C = \left[F_I^N + K^N F_{KI}^N a\right] < 1$. Denoting $F_{KI}^N K^S (1-a) = D$ and rearranging gives

$$V_I^* = (1-\delta)\left[V_G(tC - 1 - tD) + V_M(-tC + F_I + D)\right] \tag{41}$$

The first term inside the square brackets is negative as $C < 1$ and it may be shown that the second term is positive. When transition is "over", i.e. $K^S = 0$, equation (41) reduces to $V_I^* = (1-\delta)\left[V_M(-tC + F_I) - V_G(tC - 1)\right]$. Analogously to the previous section, the interest here centers on the case when social public good is underprovided in the non-cooperative equilibrium indicating that $V_G > V_M$. Thus, a sufficient condition for $V_I^* < 0$ is $-tC + F_I < -(tC - 1) \Leftrightarrow F_I < 1$ which holds always. In late transition, starting from a noncooperative equilibrium, a common increase in I financed by a decrease in G is welfare deteriorating. Consequently, under similar conditions, a common decrease in I would increase consumer welfare. When the economy is close to a normal one-sector economy, competition clearly distorts the public goods mix toward insufficient G and excessive I.

When both sectors exist the result is less straightforward. A sufficient condition[32] for $V_I^* < 0$ is $-tC + F_I + D < -(tC - 1 - tD) \Leftrightarrow F_I + D(1-t) < 1$. The last inequality may or may not hold. However, it may be assumed that the greater the productivity increase F_I and the bigger the share of the old sector K^S, the lower the probability that the welfare change (41) will be negative. Indeed, a coordinated increase in G in early transition may be welfare-deteriorating. Thus, consumers may prefer to change the public goods mix toward even more infrastructure public good in early transition.

Finally, as was the case with the results of the basic model, the existence of a productivity difference β seems to reduce the welfare effect of any coordinated policy move. As β increases, $(1-\delta)$ decreases. Consequently, (41) decreases with any change in the level of welfare.

Proposition 3 *If decision-makers own state sector firms and rents from that sector accrue to them, and starting from a non-cooperative equilibrium where the social public good is underprovided:*

a) A common increase in the provision of G financed solely by a decrease in I may decrease the consumer's welfare in early transition.

b) It is always in the private interest of decision-makers to agree on a coordinated decrease in I.

The results summarized in the proposition 3 are similar to those of proposition 2. The classical result, which states that in a non-cooperative equilibrium the level of public good provision is too low and its composition is distorted toward insufficient provision of the social public good, is confirmed when the economy is close to a normal one-sector economy dominated by new sector production. However, in early transition consumers may prefer non-cooperative equilibrium to any common increase in G financed by a decrease in I. This somewhat surprising

[32] $V_I^* < 0 \Leftrightarrow V_M(-tC + F_I + D) < V_G(1 + tD - tC) \Leftrightarrow \frac{(-tC+F_I+D)}{(1+tD-tC)} < \frac{V_G}{V_M}$. As by assumption $\frac{V_G}{V_M} > 1$, the sufficient condition for $V_I^* < 0$ is $\frac{(-tC+F_I+D)}{(1+tD-tC)} < 1 \Leftrightarrow (-tC + F_I + D) < (1 + tD - tC)$.

result is in line with Qian-Roland's (1998) finding that in a transition economy fiscal competition is sometimes beneficial.

This offers a rationale for decentralizing some economic decision-making at the beginning of economic transition. If the starting point for transition is best described as a centralized equilibrium dominated by old sector enterprises, decentralizing decision-making and consequently allowing fiscal competition to emerge may increase consumer welfare.

The second part of the proposition (b) 3 may strenghthen the argument for decentralization early in transition. Starting from a non-cooperative equilibrium, allowing for a common increase in I directly harms decision-makers by decreasing their private benefit, i.e. $R_I^{S*} = -\rho_I K^S < 0$. Even if such a move increases consumer welfare, it certainly reduces decision-makers private benefit. Moreover, the larger the state sector (i.e. the larger K^S), the bigger the loss in decision-maker's private benefit due to an the increase in I. In other words, the decision-makers may be extremely reluctant to increase infrastructure public good provision in early transition. Thus, it is possible for small values of α that such a coordinated move will never occur or that a coordinated move would even decrease I thus reducing consumer welfare. As regional decision-makers are stakeholders in state sector enterprises, they have a private incentive to delay transition by coordinating their tax and expenditure policies and potentially providing less public infrastructure.

5 Conclusions

In this paper, I examined welfare effects of regional tax and commodities competition in a simplified transition economy with several regions and two distinct sectors (an old state sector and a new private sector) each receiving different tax treatment. The old sector has lower productivity compared to the new sector. For the purposes of the proposed model, transition is seen as a shifting of the

economy's resources from the old state sector to the new sector. Transition is seen to be completed when no inefficient old sector production remains. Moving any amount of resources from the old to the new sector always increases total production in a respective region.

Another transition feature applied in my model helps explain why all resources are not immediately shifted to the new, more efficient sector. I assume that the regional decision-makers are not entirely benevolent, but instead seek to maximize a weighted average of the utility of their citizens and their private benefit. In line with considerable anecdotal and empirical evidence from many transition countries (especially FSU countries), I make the assumption that the decision-makers have a private interest in the old sector production. They are in fact the owners of old sector production. This leads to a setting where net rents from old sector activity accrue not to local citizens but to local decision-makers. The regional governments in my model use rent taxation and capital tax on new sector capital to finance the provision of pure local public goods.

It was shown that the type of private benefit greatly influences the welfare results of the model. In the setting of this paper, where decision-makers own old sector rents, we found that a common increase in provision of the public good was always welfare-improving only late in transition. If the economy is at a very early stage in its transition with a significant share of economic activity still in the old sector, the citizens of the federation may prefer a competitive equilibrium to a policy change involving an increase in both provision of the public good and capital taxation.

In section four the basic model was enlarged to allow for two types of public goods; a social public good and an intrastructure public good that benefits new sector production. Along the lines of Keen-Marchand (1997), I demonstrated that when regions compete by offering large amounts of the infrastructure business public good, the social public good is underprovided in equilibrium. As in the basic model, if the decision-makers own old sector rents, a common increase in the social public good will be welfare-improving only in the late stages of transition.

In both the basic model and the enlarged model, the magnitude of welfare change was negatively correlated with the productivity difference of the two sectors and with the share of capital remaining in the old sector.

Moreover, since decision-makers enjoy private benefit from old sector production, it is never in their private interest to agree on a common decrease in taxes on the new sector or to increase the provision levels of the business public good. Consequently, even in the cases when such policy moves could increase social welfare such changes may not occur. Perhaps the most striking finding was that in early transition, when regional competition would be socially beneficial, it is least likely to emerge. As the total amount of rents from the old sector is positively correlated with total amount of production in the less efficient sector, it is precisely in early transition that the decision-makers have least interest in engaging in a competition for mobile capital.

This result is somewhat disturbing. We can conclude that the transition features incorporated in a classical tax competition model make regional fiscal competition less harmful, and consequently make coordination less beneficial. Coordination of actions by decision-makers in different regions in early transition may be detrimental to social welfare. However, if decision-makers when decision-makers assign little weight to social welfare, the model predicts that even in early transition coordination will be chosen. In order to benefit from decentralization and regional competition, a transition economy needs to ensure that decision-makers do not give too much preference to their private benefit.

The model presented here is admittedly very simple and rather restrictive assumptions were utilized. Above all, the assumption of small and identical regions does not fit particularly well into the picture. Nevertheless, the preliminary results suggest that this is a useful and meaningful way to proceed. A possibility for further research could be to add elements of the federal government into the model and thus bring in elements of vertical competition. Another possibly tempting area for study is the structure of decision-maker preferences. As the assumptions used in this model were purely exogenous, a political economy model with lobby-

ing could give more insights into the decision-making process. Further, as is the case in many models of fiscal competition, the labor market was omitted entirely from this analysis. Most transition countries have experienced large and persistent unemployment during the 1990s, and this combined with other labor market imperfections must certainly influence economic functions both through the public sector's budget constraint and in terms of decision-maker utility. Finally, as I mention repeatedly, static models have serious limitations in analyzing the transition process. Using a dynamic framework, for example along the lines proposed in Wildasin (2000), would undoubtedly greatly enrich the present analysis.

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7 Appendices

7.1 Appendix A (Deriving results in Table 1)

Non-cooperative case (regional action)	Cooperative case (federal action)
$R_T^N = -K^N < 0$	$R_T^{N*} = -K^N (1 + \rho_T^*) < 0$
$R_T^S = 0$	$R_T^{S*} = -K^S \rho_T^* > 0$
$K_T^N = \frac{1}{F_{KK}^N} < 0$	$K_T^{N*} = \frac{1}{(1+\beta)F_{KK}^S} < 0 \ \forall \rho$
$K_T^S = 0$	$K_T^{S*} = -K_T^{N*}$
$\rho_T = 0$	$\rho_T^* = F_{KK}^N K_T^N - 1 = \frac{-1}{1+\beta} < 0$
$\bar{R}_T = -K^N$	$\bar{R}_T^* = -K^N + \bar{K}\frac{1}{1+\beta}$

Proofs:

Using equation (3), the change in rents due to a small change in capital tax in non-cooperative setting is

$$R_T^N = K_T^N \left(F_K^N - \rho - T\right) - K^N = -K^N \tag{A1}$$

and respectively

$$R_T^S = K_T^S \left(F_K^S - \rho\right) = 0 \tag{A2}$$

Since a common increase in capital tax decreases net return on capital, the change in rents caused by such a policy are

$$\begin{aligned} R_T^{N*} &= K_T^N \left(F_K^N - \rho - T\right) - K^N (1 + \rho_T) && \text{(A3)} \\ &= -K^N (1 + \rho_T) < 0 && \text{(A4)} \end{aligned}$$

$$R_T^{S*} = K_T^S \left(F_K^S - \rho\right) - K^S \rho_T = -K^S \rho_T > 0 \tag{A4}$$

and finally

$$\bar{R}_T^* = -\bar{K} \rho_T - K^N \tag{A5}$$

Differentiating (3) with respect to T in non-coordinated situation gives

$$\beta F_{KK}^S K_T^N - 1 = F_{KK}^S K_T^S \tag{A6}$$

and by rearranging we obtain

$$K_T^N = \frac{1}{\beta F_{KK}^S} = \frac{1}{F_{KK}^N} \tag{A7}$$

Similarily differentiating (3) with respect to $T^*$for $d\rho = 0$ gives

$$\beta F_{KK}^S K_T^{N*} - 1 = F_{KK}^S K_T^{S*} \tag{A8}$$

and by rearranging and applying $K_T^{N*} = -K_T^{S*}$we obtain

$$K_T^{N*} = \frac{1}{(1+\beta) F_{KK}^S} \tag{A9}$$

Differentiating (3) with respect to net return on capital in a coordinated setting gives

$$\rho_T = \beta F_{KK}^S K_T^{N*} - 1 = F_{KK}^S K_T^{S*} = -F_{KK}^S K_T^{N*} \tag{A10}$$

Combining with the above, and rearranging, we obtain

$$\rho_T = \frac{\beta}{1+\beta} - 1 = \frac{-1}{1+\beta} \tag{A11}$$

7.2 Appendix B (equation (18))

$$
\begin{aligned}
\frac{dV}{dT^*} &= V_G\left(K^N + TK_T^{N*} + t\bar{R}_T^*\right) + V_m(1-t)R_T^{N*} + V_m\rho_T\bar{K} \qquad \text{(B1)} \\
&= V_G\left(K^N + t\bar{R}_T^*\right) + V_m R_T^{N*} - V_m t R_T^{N*} + V_m\rho_T\bar{K} + V_G T K_T^{N*} \\
&= V_G\left(K^N + t\bar{R}_T^*\right) - V_m(K^N + \rho_T K^N) - V_m t R_T^{N*} + V_m t R_T^{S*} \\
&\quad -V_m t R_T^{S*} + V_m\rho_T\bar{K} + V_G T K_T^{N*} \\
&= \left(K^N + t\bar{R}_T^*\right)(V_G - V_m) - V_m\left(\rho_T K^N - tR_T^{S*} - \rho_T\bar{K}\right) \\
&\quad +V_G T K_T^{N*} \\
&= \left(K^N + t\bar{R}_T^*\right)(V_G - V_m) - V_m\left(\rho_T K^N - t\left(-K^S\rho_T\right) - \rho_T\bar{K}\right) \\
&\quad +V_G T K_T^{N*} \\
&= \left(K^N + t\bar{R}_T^*\right)(V_G - V_m) + V_G T K_T^{N*} \\
&\quad -V_m\rho_T\left(K^N + tK^S - K^S - K^N\right) \\
&= \left(K^N + t\bar{R}_T^*\right)(V_G - V_m) + V_G T K_T^{N*} - V_m\rho_T K^S(t-1) \\
&= \left(K^N + t\bar{R}_T^*\right)(V_G - V_m) + V_G T K_T^{N*} + V_m\rho_T K^S(1-t) \qquad \text{(B2)}
\end{aligned}
$$

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