



Asymmetric tax competition and fiscal equalization in a repeated game setting



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ABSTRACT

This paper examines the relationship between tax competition and fiscal equalization in a standard tax competition model with repeated actions, in which regions differ in per capita capital endowments and production technologies. In particular, it asks how a fiscal equalization scheme affects the tax cooperation condition. It shows that when the scale of fiscal equalization scheme increases, capital exporter is more (and capital importer is less) cooperative in implementing tax coordination. The paper also demonstrates that the best cooperative tax rate – the one that provides the strongest potential for voluntary cooperation – takes a positive value and increases with the scale of fiscal equalization.

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1. Introduction

The efficiency and redistributive effects of tax competition have been extensively investigated in the literature of public finance. When a region increases its tax rate, the outflow of the tax base generates a positive fiscal externality. Tax competition thus induces an inefficiently low tax rate and low public service level. Starting from the seminal work of [Zodrow and Mieszkowski \(1986\)](#) and [Wilson \(1986\)](#), a number of studies have focused on the inefficiency caused by the fiscal externality in the tax competition environment. At the same time, another source of inefficiency is inherent in tax competition economy. In order to maximize the total output of all regions, the capital should be allocated to equalize the marginal products of capital among regions. However, the diverse regions choose different tax rates, which cuts in on the equalization of the marginal products of capital. Hence, the equilibrium allocation of capital generally does not coincide with the efficient one. No matter which distortion the government faces, the potential for cooperation to arise in a repeated interaction environment is well

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known. Thus, the repeated interaction models of tax competition would provide a better perspective on obtaining sustainable and efficient tax coordination among local governments.² The precedent studies on the repeated interaction model of tax competition have clarified the effects on the possibility for tax cooperation of regional heterogeneity, benefit spillovers of local public goods, and the introduction of the minimum tax standard. This paper follows the works on the repeated interaction model of tax competition, and on this basis, focuses on the practically important but unconsidered factor, that is, the interregional fiscal equalization scheme. Specifically, the paper incorporates the interregional fiscal equalization scheme in the repeated tax competition model to analyze the effects on the possibility of achieving tax cooperation. The precedent studies of a repeated game model have not yet taken the fiscal equalization scheme into account, and thus we have a nodding acquaintance with the effects of fiscal equalization scheme aiming for interregional equalization on the efficiency-enhancing tax cooperation.

Our motivation for incorporating the fiscal equalization scheme in the repeated tax competition model is the fact that it is an integral part of existing federal arrangements. In the United States, the state tax sharing is one of the two forms of intergovernmental aid to local governments, and the largest element of state expenditure. Within the European Union, the Structural Fund and the Cohesion Fund allocate more than 40% of the EU budget to under-developed regions and states. Fiscal equalization schemes have also been implemented in Canada, Australia, Denmark and Switzerland, as well as numerous developing countries. These facts suggest that, on the one hand, the states in the US and countries in the EU engage in tax competition, on the other hand, the federal governments have implemented strong equalization policies in order to narrow down the disparity in the regions. Our aim is to clarify how the fiscal equalization scheme affects the incentive to compete or cooperate in interregional tax competition.³

The issues related to our interests have recently been addressed in the literature. *Janeba and Peters (2000)* demonstrate that capital tax rates increase if regions are combined into a single tax revenue equalization system. In such a case, fiscal transfers partially internalize fiscal externalities. *Koethenbueger (2002)* analyzes the relationship between fiscal equalization and tax competition in a standard model of capital tax competition among regions that are allowed to have differing labor endowments. The study indicates that fiscal equalization may eliminate the externalities induced by tax competition. *Kotsogiannis (2010)* extends the analysis to a standard capital tax competition model, in which horizontal and vertical tax externalities between regions and between the levels of government, respectively. He shows that an efficient level of lower-level government taxation can be achieved with an appropriately adjusted standard tax base equalization formula. However, the above mentioned studies, analyze the function of fiscal equalization scheme within the framework of one-shot tax competition. Deviating from the conventional static tax competition framework, this paper investigates the relationship between tax competition and fiscal equalization in a dynamic game setting, which enables us to determine how the fiscal equalization scheme affects the incentive for long-run tax coordination of independent regions. Specifically, our research objective is to find the answers for the following questions; (i) how the change in scale of fiscal equalization transfers affects the incentive of independent regions to tax cooperation?, and (ii) how the change in scale of fiscal equalization affects the best cooperative tax rate, which provides the strongest incentive for regions to tax cooperate?

The most related work to this study is that of *Kawachi, Ogawa, and Wang (2014)*, which examines the effects of equalization transfers on the possibility for tax cooperation. Their study is based on that of *Cardarelli, Taugourdeau, and Vidal (2002)*, in which (i) production activity does not occur; (ii) the interest rate is exogenously determined at zero; and (iii) when capital is invested abroad, a sunk cost occurs. In our paper, we follow the model of *Itaya, Okamura, and Yamaguchi (2008)* which is free from above three assumptions. The greatest benefit of using of the model of *Itaya et al. (2008)* is that it facilitates our analysis on effects of equalization transfers allowing the regional asymmetries. Thus, we clarify the differential effects of fiscal equalization scheme between capital exporting/importing regions, which has not been analyzed in the symmetric-region model of *Kawachi et al. (2014)*. In particular, the current paper also differs from the work of *Kawachi et al. (2014)*, in which tax cooperation aims to overcome the problem of inefficiently low tax due to fiscal externality, whereas our paper seeks to correct inefficient capital allocation.

The main results of this paper are as follows. (i) When the scale of fiscal equalization scheme increases, the capital exporter is more likely to cooperate; however, the capital importer is less likely to cooperate. (ii) While the best cooperative tax rate without fiscal equalization scheme is zero, as shown by *Itaya et al. (2008)*, it takes a positive value and increases with the scale of fiscal transfer in the presence of the fiscal equalization scheme. (iii) In the cooperation phase, the introduction of the fiscal equalization scheme lowers the welfare of the large region and raises the welfare of the small region.

² A repeated tax competition to overcome the issue of low tax rate caused by fiscal externality was first presented by *Cardarelli et al. (2002)*. *Kawachi and Ogawa (2006)* extend the model to incorporate the benefit spillovers of local public goods to show that the cooperative outcome tends to take as the magnitude of spillover is significant. *Taugourdeau (2004)* and *Catenaro and Vidal (2006)* use the Leviathan tax competition model with repeated interactions and demonstrate that tax coordination is not sustainable when region sizes are too different. *Kiss (2012)* shows that the introduction of an agreement about a lower bound for admissible tax rates triggers a "race to the bottom", thereby worsening the statuses of all countries. Finally, the most recent study of *Kawachi et al. (2014)* studies how the existence of equalization transfer system affects the sustainability of tax cooperation. Prior to these studies, *Coates (1993)* investigates the open-loop equilibrium of a dynamic game of property tax competition and shows that there may be incentives to subsidize capital. How the repeated interaction among regions overcomes the issue of inefficient capital allocation was first presented by *Itaya et al. (2008)*. The particular feature of this study is the isolation of the issue of capital allocation from the problem of public goods by assuming that there are substantively no public goods in the economy. *Itaya, Okamura, and Yamaguchi (2014)* also follow this approach and deal with the partial coordination in a three-country model.

³ The rationales offered for interregional fiscal transfers in our study are based on standard efficiency and equity arguments. Although we do not deal with risk and uncertainty issues, the equalization transfer systems are also justified from the aspect of smoothing the adverse idiosyncratic shocks to local governments (*Boadway and Shah 2007*). See the works of *Bucovetsky (1997)*, *Wildasin and Wilson (1998)*, *Lee (2004)*, *Sanjo (2012)*, and *Kalamov (2013)* for the tax competition analyses with risk.

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