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Endogenizing Government's Objectives in Tax Competition with Capital Ownership

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Abstract

In this paper, we extend the standard approach of horizontal tax competition by endogenizing the policy objectives that governments pursue. Following the literature on strategic delegation games, we consider a preplay stage, where jurisdictions commit themselves to act as Leviathan or as benevolent agents. We show that the sub-game perfect equilibria (SPEs) correspond to the three cases of tax competition between (i) the Leviathan and the benevolent government, (ii) both Leviathans, and (iii) both benevolent governments, depending on the form of capital ownership. The results provide grounds for the assumption of government objective made in literature, and explain why some governments behave as Leviathans, while others as benevolent agents in international tax competition.

Keywords: Tax competition; Endogenous policy objective; Leviathan; Benevolent government

JEL classification: F21, H11, H73, H77

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1 Introduction

Drawing from the seminal work of Zodrow and Mieszkowski (1986) and Wilson (1986), numerous studies on capital tax competition clarify the effects of interregional competition for mobile capital. One standard result in the literature is that tax competition brings pressure on governments to decrease their tax rates on mobile capital. This argument is quite understandable from the inverse elasticity rule of optimal taxation, and helps explain why countries in Europe decreased their corporate income tax from the 1990s onward. Contrary to the theory as positive perspective, the normative analyses present indistinct opinions on tax competition. If the model assumes a benevolent government that aims to maximize residents' welfare, the tax competition is regarded as problem-causing, since it reduces tax rates to an inefficient lower level. In contrast, if the model assumes the governments are Leviathans seeking to extend their power by increasing the scale of government, tax competition exerts downward pressure on government size, improving welfare.[1]

Accordingly, the equilibrium and welfare implications of tax competition are dependent on the government objective, which has been set arbitrarily for research purposes: On the one hand, the welfare-maximizing government as benevolent agent has been widely used, but on the other hand the Leviathan-type government has also been useful in the literature. This study contributes to tax competition theories by studying which of the government objectives is commitment robust. Consequently, we study the endogenous objective function of the tax-decision maker in an asymmetric capital tax competition, while considering how national citizens that engage in international tax competition can motivate policy-makers toward welfare-maximization. In the global market, governments compete not only on the tax or subsidy rate, but also with other policy instruments, such as public infrastructure investments, education and labor training, and special taxation measures. When set by citizens of a sovereign state, the target of the policy makers can be an effective instrument for assuming an advantageous position in tax competition. Since asymmetric countries have different desirable tax rates levels, the welfare-maximizing citizens set different objectives for policy makers in different countries, which would explain why some countries behave as Leviathans and others are benevolent. In this paper, we show that citizens render policy-makers to maximize their welfare when the residents in the economy own all capital, while they motivate them to seek out tax revenue when absentee owners own the capital. Furthermore, the objective of policy-makers targeted by the citizens differs between capital importing and

[1] See Wilson and Wildasin (2004) for the review on the pros and cons of capital tax competition.

capital exporting countries; policy-makers in a capital-exporting (-importing) country are likely to behave as a benevolent (Leviathan) government.

The study of Pal and Sharma (2013), which endogenizes objective functions of countries in a tax competition model, is closely related to our own study. Following Vickers (1985), Fershtman and Judd (1987), and Sklivas (1987), they consider strategic incentive delegation in the context of a two-stage tax competition. The main finding of their paper is having governments pursue tax revenue as a dominant strategy for citizens who maximize welfare and behave as if they are net tax revenue maximizers.[2] In other words, as their contribution, it is demonstrated that tax revenue maximization is may be an equilibrium policy, even when citizens care also about private consumption and choose the objective function of their government. We extend the analysis of Pal and Sharma by focusing on the asymmetry among the countries, used for deducing the hidden equilibrium. Specifically, one of the contributions of our paper is to demonstrate that Pal and Sharma's (2013) argument depends on the form of capital ownership, that is, absentee capital ownership. To facilitate our analysis, we generalize their model by formulating a general form of capital ownership to capture both absentee and non-absentee capital ownership.

The world is composed of nations with diverse characteristics, but the ideal ultimate goal of each government is simple: to improve citizen's welfare. Even though the countries with different characteristics pursue the same objective, the means for achieving the goals are different. While one country may set objective other than welfare maximization, as shown in Pal and Sharma (2013), resulting in maximizing the citizen's welfare, other countries may directly try to achieve its ultimate goal. Since the different governments have to "manipulate" the economic factors to achieve their objectives in different ways, the target in their policy settings can be chosen strategically and will be different for each country. Our paper clarifies which country deviates from ultimate goal in their policy settings and which country acts faithfully to their ideal objective.

This simple extension produces three patterns of possible equilibria; (i) all governments act as if they are Leviathans if the capital is owned by absentee owners; (ii) all governments act as if they are benevolent; and (iii) the governments in capital-poor countries behaves as Leviathans while the governments in capital-rich country behaves as benevolent. The first case corresponds to the argument made by Pal and Sharma (2013), while the equilibria are refined in the other two cases. These results show that Pal and Sharma's (2013) study is

[2]They extend the baseline model to incorporate production asymmetries, sequential move structure, and competition in public investment and show that maximizing welfare rather than maximizing tax revenue is the dominant strategy, at least, in one country in the sequential-move game.

relevant for economies where the capital is owned by absentee owners; however, our analysis suggests that for economies with non-absentee capital ownership, we may expect governments to attach weight to welfare in tax competition.

The critical difference between this study and the one conducted by Pal and Sharma (2013) is in the incentives to manipulate the terms of trade. In the absentee ownership model, residents in all countries have the same incentive to control the terms of trade. Since all the returns to capital are removed from these countries, all of them prefer low-priced capital so as to hold down payment. For this purpose, citizens force policy-makers to seek out tax revenue from higher tax rates, and capital price diminishes. By contrast, if the initial capital is owned by a resident of the country, just like the canonical tax competition model, the asymmetry among countries produces different incentives to manipulate the price of capital. Residents in capital-exporting countries try to raise the price of capital to increase their income from capital exports, whereas the residents in capital-importing countries try to lower the price of capital to reduce their import costs. When there are dissimilar incentives to manipulate the price of capital, the citizens in different countries set different objectives for the policy-makers, which is different from the results of Pal and Sharma (2013).

The remainder of this paper is organized as follows. In the section 2, we present an asymmetric tax competition model. The asymmetry is captured by the difference in capital endowment between two countries. The equilibrium properties are presented in Section 3 along with the main results. Section 4 presents the discussion of the model, which is extended to include the *moderate* Leviathan and the public goods. Section 5 offers conclusions.

2 The Model

2.1 Basic Settings

Capital endowment. There are two countries, and in each country i ($i = 1, 2$), there are homogeneous residents normalized at 1.[3] The production of private goods requires capital and labor with CRS technology and the total amount of production capital per capita in this economy is κ. The residents of the two countries have an initial endowment of capital $\delta\kappa$, and the rest of the endowment, $(1 - \delta)\kappa$, is owned by the absentee capital owners living outside of the countries, where $\delta \in [0, 1]$ characterizes the form of capital ownership. When $\delta = 0$, the capital is fully owned by absentee owners, and our model becomes

[3]The basic settings, that is, preferences and technologies, follow the works of Itaya et al. (2008), Kemp and Rota-Graziosi (2010, 2015), Ogawa (2013), Eichner (2014), Hindriks and Nishimura (2015), Kawachi et al. (2015), and among others.

similar to the Pal and Sharma model; however, $\delta = 1$ corresponds to a non-absentee capital ownership environment, which is assumed in the canonical tax competition model.

The initially endowed capital per capita in country i is defined by $\kappa_i \equiv \theta_i \delta \kappa$, where θ_i is the share of capital endowment in country i ($\theta_i \in [0,1], \theta_1 + \theta_2 = 1$). When $\theta_1 = 0$, the residents of country 1 have no capital endowment, but those of country 2 have full capital endowment, and vice versa when $\theta_1 = 1$. All capital is assumed to be freely mobile between the two countries.

Firms. We assume that the production per capita in country i is based on the function $y_i = (A - k_i)k_i$, where k_i stands for the capital per capita in country i and $A > 0$ is a parameter. The profit of firms in country i is yielded as $\pi_i = (A - k_i)k_i - w_i - rk_i - T_i k_i$, where w_i denotes the wage rate, r the capital price in the integrated capital market, and T_i the capital tax rate determined by the government.

From perfect mobility of capital and the capital-market clearing condition, it is implied that

$$r = A - 2k_i - T_i, \tag{1}$$

$$\kappa = k_1 + k_2. \tag{2}$$

Using (1) and (2), the amount of capital in country i and the price of capital are given as follows:

$$k_i = \frac{\kappa}{2} - \frac{T_i - T_j}{4}, \tag{3}$$

$$r = A - \kappa - \frac{T_1 + T_2}{2}. \tag{4}$$

Residents. The preference of citizens in country i is defined by $U(c_i) = c_i$, where c_i is the consumption of a private numeraire good. The total amount of citizen's income consists of labor income, $f(k_i) - f_k(k_i)k_i$, rent from capital, $r\theta_i\delta\kappa$, and a lump-sum transfer from government, G_i. Hence, the budget constraint of the citizens in country i becomes:

$$c_i = f(k_i) - f_k(k_i)k_i + r\theta_i\delta\kappa + G_i. \tag{5}$$

Government. Policy makers in the government of country i chooses a unit tax rate, T_i, on capital used in production within the country and redistribute the

tax revenue to citizens as lump-sums, G_i. Consequently, the budget constraint of the government of country i is

$$G_i = T_i k_i. \tag{6}$$

We consider a principal-agent framework in which the welfare-maximizing residents delegate the right to decide the capital tax rate to the policy-maker (called *government*), whose objective is represented by a linear combination of resident's welfare, U_i, and the size of tax revenue, G_i;

$$V_i = (1 - a_i)U_i + a_i G_i, \tag{7}$$

where $a_i \in [0, 1]$ is the incentive parameter chosen by the residents in country i. For clarity, we assume that a_i is a binary variable that can be either 0 (benevolent government) or 1 (the Leviathan).[4]

2.2 Timing of the Game

We define the timing of the two-stage game as follows:

1. In each country, the residents choose an incentive parameter, a_i, for the policy-maker simultaneously. The choice is whether they act as a welfare-maximizing government or tax-revenue-maximizing government.

2. With a commitment to the determination in the first stage, policy-makers set their tax rate, T_i, simultaneously and independently.

Note that the ultimate goal of the residents is to maximize welfare within the country, which implies that they do not want a Leviathan government, even if they choose to become so. They just force the policy maker to act as the Leviathan in order to maximize the welfare at equilibrium.

Finally, we here explain a system of notation. $U_1(a_1, a_2)$ denotes the utility level of citizens in country 1 in the sub-game equilibrium. For instance, $U_1(1, 0)$ indicates the utility level of citizens in country 1 in the equilibrium where the government of country 1 acts as the Leviathan and the government of country 2 acts as the benevolent government. Similarly, $U_2(0, 0)$ indicates the utility level of citizens in country 2 in the equilibrium where the governments of both country

[4]The Leviathan-type government, first proposed by Brenann and Buchanan (1977, 1980) and followed by Kanbur and Keen (1993), Ohsawa (1999), Wang (1999), Keen and Kotsogiannis (2003) in the tax competition literature, maximizes the fiscal surplus that consists of tax revenue minus cost for providing public goods. However, we here simply assume the objective of the Leviathan is the tax revenue maximization since the results do not change if we follow the approach of Brenann and Buchanan.

Country 1/Country 2	Benevolent ($a_2 = 0$)	Leviathan ($a_2 = 1$)
Benevolent ($a_1 = 0$)	$U_1(0,0)$, $U_2(0,0)$	$U_1(0,1)$, $U_2(0,1)$
Leviathan ($a_1 = 1$)	$U_1(1,0)$, $U_2(1,0)$	$U_1(1,1)$, $U_2(1,1)$

Table 1. Payoff Matrix

Note. First (second) coordinate in each pair is payoff to country 1 (2).

act as benevolent agents in the stage of tax competition. These expressions are also applied for values T_i, k_i, and r, in the subsequent analysis.

Applying the concept of sub-game perfect Nash equilibrium, we solve this game backwards. The payoff matrix in the first stage is shown in Table 1 with the definitions of utilities in each sub-game.

3 Equilibrium

3.1 Second Stage

Given a tax rate of the other country, j, the policy-maker in country i (characterized by a_i, selected in the first stage) determines the tax rate, T_i, by solving the following maximization problem:

$$\begin{aligned} \max_{T_i} \quad & V_i = (1 - a_i)U_i + a_i G_i, \\ \text{s.t.} \quad & (3) \text{ and } (4). \end{aligned}$$

The first-order condition yields the following reaction function for country i:

$$T_i = \frac{a_i + 1}{a_i + 3} T_j + 2\kappa \frac{(a_i + 1) - 2\theta_i \delta (1 - a_i)}{a_i + 3}. \tag{8}$$

Solving the simultaneous equations for $i = 1, 2$, we obtain the capital tax rate of country i in the sub-game equilibrium:

$$T_i = 2\kappa \frac{\theta_i \delta (a_j + 3)(a_i - 1) + \theta_j \delta (a_j - 1)(a_i + 1) + (a_j + 2)(a_i + 1)}{a_i + a_j + 4}. \tag{9}$$

By substituting (9) into (3)-(4), the equilibrium values are obtained as follows:

$$k_i = \frac{\delta\theta_i - \delta\theta_j + a_j(\delta\theta_j + 1) - \delta\theta_i a_i + 2}{a_i + a_j + 4}\kappa, \tag{10}$$

$$r = A - 2\kappa\frac{\delta\theta_i(a_i - 1)(a_j + 2) + \theta_j\delta(a_j - 1)(a_i + 2) + (a_j + 2)(a_i + 2)}{a_i + a_j + 4}. \tag{11}$$

3.2 First Stage

3.2.1 Payoffs in Each Sub-Game

As the preliminary results for the sub-game perfect Nash equilibrium of this game, we derive the lemmas showing the utilities of citizens in each country.

Lemma 1 *When both governments act benevolent, the utilities of each country's citizens are:*

$$U_1(0,0) = \kappa\delta\theta_1 A + \frac{11\delta^2\theta_1^2 + 3\delta^2\theta_2^2 - 36\delta\theta_1 - 12\delta\theta_2 + 18\delta^2\theta_1\theta_2 + 12}{16}\kappa^2,$$

$$U_2(0,0) = \kappa\delta\theta_2 A + \frac{3\delta^2\theta_1^2 + 11\delta^2\theta_2^2 - 12\delta\theta_1 - 36\delta\theta_2 + 18\delta^2\theta_1\theta_2 + 12}{16}\kappa^2.$$

Proof. From (9)-(11), $T_i(0,0)$, $k_i(0,0)$ and $r(0,0)$ are yielded as $T_1(0,0) = (2 - 3\delta\theta_1 - \delta\theta_2)\kappa/2$, $T_2(0,0) = (2 - \delta\theta_1 - 3\delta\theta_2)\kappa/2$, $k_1(0,0) = (\delta\theta_1 - \delta\theta_2 + 2)\kappa/4$, $k_2(0,0) = (\delta\theta_2 - \delta\theta_1 + 2)\kappa/4$, and $r = A + \kappa(\delta\theta_1 + \delta\theta_2 - 2)$. If substituting these values to the utility function $U_i(c_i)$, the equilibrium values above are derived.

Lemma 2 *When the government of country 1 chooses to act as a Leviathan and the government of country 2 chooses to act as benevolent, the utilities of each country's citizens are:*

$$U_1(1,0) = \kappa\delta\theta_1 A + \frac{(\delta\theta_2 - 2)(6\delta\theta_1 + \delta\theta_2 - 2)}{5}\kappa^2,$$

$$U_2(1,0) = \kappa\delta\theta_2 A + \frac{\left(23\delta^2\theta_2^2 - 72\delta\theta_2 + 27\right)}{25}\kappa^2.$$

Proof. From (9)-(11), $T_i(1,0)$, $k_i(1,0)$ and $r(1,0)$ are yielded as $T_1(1,0) = 4(2 - \delta\theta_2)\kappa/5$, $T_2(1,0) = 2(3 - 4\delta\theta_2)\kappa/5$, $k_1(1,0) = (2 - \delta\theta_2)\kappa/5$, $k_2(1,0) = (\delta\theta_2 + 3)\kappa/5$, and $r(1,0) = A - 6\kappa(2 - \delta\theta_2)/5$. If substituting these values to the utility function $U_i(c_i)$, the equilibrium values above are derived.

Lemma 3 *When the government of country 1 chooses to act benevolent and the government of country 2, Leviathan, the utilities of each country's citizens are:*

$$\begin{aligned} U_1(0,1) &= \kappa\delta\theta_1 A + \frac{\left(23\delta^2\theta_1^2 - 72\delta\theta_1 + 27\right)}{25}\kappa^2, \\ U_2(0,1) &= \kappa\delta\theta_2 A + \frac{(\delta\theta_1 - 2)(\delta\theta_1 + 6\delta\theta_2 - 2)}{5}\kappa^2. \end{aligned}$$

Proof. From (9)-(11), $T_i(0,1)$, $k_i(0,1)$ and $r(0,1)$ are yielded as $T_1(0,1) = 2(3-4\delta\theta_1)\kappa/5$, $T_2(0,1) = 4(2-\delta\theta_1)\kappa/5$, $k_1(0,1) = (\delta\theta_1+3)\kappa/5$, $k_2(0,1) = (2-\delta\theta_1)\kappa/5$, and $r(0,1) = A - 6\kappa(2-\delta\theta_1)/5$. If substituting these values to the utility function $U_i(c_i)$, the equilibrium values above are derived.

Lemma 4 *When both governments act as Leviathans, the utilities of each country's citizens are:*

$$\begin{aligned} U_1(1,1) &= \kappa\delta\theta_1 A + \frac{(5 - 12\delta\theta_1)}{4}\kappa^2, \\ U_2(1,1) &= \kappa\delta\theta_2 A + \frac{(5 - 12\delta\theta_2)}{4}\kappa^2. \end{aligned}$$

Proof. From (9)-(11), $T_i(1,1)$, $k_i(1,1)$ and $r(1,1)$ are yielded as $T_1(1,1) = T_2(1,1) = 2\kappa$, $k_1(1,1) = k_2(1,1) = \kappa/2$ and $r(1,1) = A - 3\kappa$. Substituting these values to the utility function $U_i(c_i)$, the equilibrium values above are derived.

Before proceeding to derivation of the SPEs, we denote $\theta_1 = \theta$ and $\theta_2 = 1-\theta$. We also make an assumption on parameters in order to guarantee that the price of capital is non-negative.

Assumption 1. $3\kappa \leq A$.

3.2.2 Sub-game Perfect Nash Equilibria

With the utility levels of each case obtained above, we compare them to derive the SPEs of this game. To begin with, the utility levels of citizens in country 1 can be compared:

$$
\begin{aligned}
U_1(0,1) - U_1(1,1) &= \frac{(46\delta\theta - 17)\,(2\delta\theta + 1)}{100}\kappa^2, \\
\therefore U_1(0,1) &\gtrless U_1(1,1) \Leftrightarrow \theta \gtrless \frac{17}{46\delta}, \qquad (12) \\
U_1(0,0) - U_1(1,0) &= \frac{(2 - \delta + 6\theta\delta)\,(\delta + 10\theta\delta - 2)}{80}\kappa^2, \\
\therefore U_1(0,0) &\gtrless U_1(1,0) \Leftrightarrow \theta \gtrless \frac{2-\delta}{10\delta}. \qquad (13)
\end{aligned}
$$

Subsequently, we compare the utility levels of citizens in country 2:

$$
\begin{aligned}
U_2(1,0) - U_2(1,1) &= -\frac{(2(1-\theta)\delta + 1)\,(17 - 46(1-\theta)\delta)}{100}\kappa^2, \\
\therefore U_2(1,1) &\gtrless U_2(1,0) \Leftrightarrow \theta \gtrless 1 - \frac{17}{46\delta}, \qquad (14) \\
U_2(0,0) - U_2(0,1) &= -\frac{(5\delta - 6\theta\delta + 2)\,(2 - 11\delta + 10\theta\delta)}{80}\kappa^2, \\
\therefore U_2(0,1) &\gtrless U_2(0,0) \Leftrightarrow \theta \gtrless 1 - \frac{2-\delta}{10\delta}. \qquad (15)
\end{aligned}
$$

Using (12)-(15) to compare utility levels, we obtain the SPEs of this objective-function game, which are depicted in Figure 1. First two propositions show that two governments behave as if they are of the same type.

Proposition 1. When $1 - (17/46\delta) < \theta < 17/46\delta$, both governments choose to act as Leviathan; $a_1 = 1$ and $a_2 = 1$. In this case, $T_1 = T_2 = 2\kappa$, and hence $T_1 = T_2$.

Proposition 2. When $(2-\delta)/10\delta < \theta < 1 - (2-\delta)/10\delta$, both governments choose to act as benevolent governments; $a_1 = 0$ and $a_2 = 0$. In this case, $T_1 = \kappa(2 - \delta - 2\theta\delta)/2$ and $T_2 = \kappa(2 - \delta - 2(1-\theta)\delta)/2$, and hence $T_1 - T_2 = \kappa\delta(1 - 2\theta)$.

The following results show that one of the two countries chooses to act as Leviathan and the other chooses to act benevolent.

Proposition 3. When $17/46\theta < \delta < 2/(11 - 10\theta)$, the government of country 1 chooses to act benevolent and the government of country 2 chooses to act as Leviathan; $a_1 = 0$ and $a_2 = 1$.[5] In this case, $T_1 = 2\kappa(3 - 4\theta\delta)/5$ and $T_2 = 4\kappa(2 - \theta\delta)/5$, and hence $T_1 - T_2 = -2\kappa(1 + 2\theta\delta)/5 < 0$.

[5] $a_1 = 0$ and $a_2 = 1$ are supported in the equilibrium when $\theta > 17/46\delta$ and $\theta > 1 - (2 - \delta)/10\delta$ hold. These conditions can be rewritten as the conditions presented in Proposition 3.

Proposition 4. When $17/46(1-\theta) < \delta < 2/(10\theta+1)$, the government of country 1 chooses to act as Leviathan and the government of country 2 chooses to act benevolent; $a_1 = 1$ and $a_2 = 0$.[6] In this case, $T_1 = 4\kappa(2-\delta(1-\theta))/5$ and $T_2 = 2\kappa(3-4\delta(1-\theta))/5$, and hence $T_1 - T_2 = 2\kappa(1+2\delta(1-\theta))/5 > 0$.

Figure 1 presents the main results of our analysis. Assuming $\delta = 0$. two governments act as Leviathans, which reproduces the findings by Pal and Sharma (2013). In contrast, when δ is sufficiently high, the argument by Pal and Sharma does not hold. Given δ is sufficiently large, we can observe that the governments tend to choose acting benevolent. For instance, when there is no absentee capital owner and all capital is initially owned by the citizens in the economy ($\delta = 1$), at least one of the governments acts benevolent. Specifically, when the asymmetry between the countries, measured by θ, is sufficiently large (or small), asymmetry in the governmental objective function shows up, while they choose to act benevolent when the asymmetry is small. Particularly, a country with a large amount of initial capital endowment tends to act as a Leviathan government, or tax-revenue-maximizing government.

[6] $a_1 = 1$ and $a_2 = 0$ are supported in the equilibrium when $\theta < 1 - (17/46\delta)$ and $\theta < (2-\delta)/10\delta$ hold. These conditions can be rewritten as the conditions presented in Proposition 4.

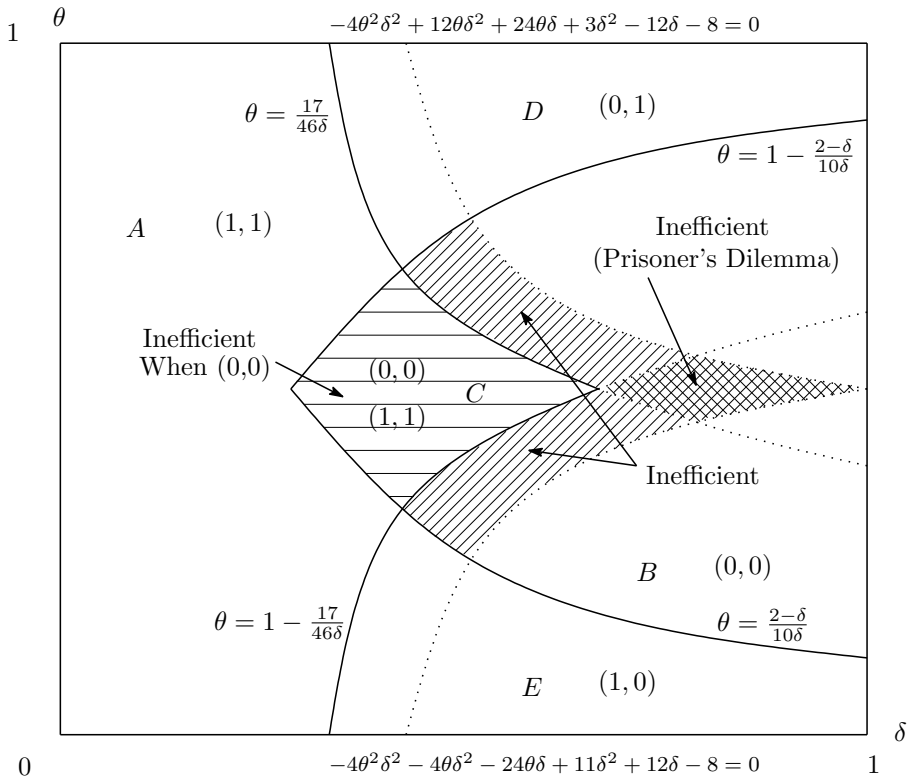

Figure 1. Equilibrium Classification

Note. $(1, 1)$ in area A means that $a_1 = 1$ and $a_2 = 1$, implying two governments act as Leviathans; $(0, 1)$ in area D means that $a_1 = 0$ and $a_2 = 1$, implying country 1 acts as the benevolent government and country 2 acts as the Leviathan, and $(1, 0)$ vice versa; $(0, 0)$ in area B means that $a_1 = 0$ and $a_2 = 0$, implying two governments act benevolent. In area C there are two equilibria. In shaded areas, results of this game are inefficient, which implies that there is room for pareto improvement.

The essential factor that allows us to interpret the result is the terms-of-trade effect, that is, the incentive to control the price of capital in the market through their tax rates. From (4), we can easily confirm that the relation between capital price in the market and tax rate in each country is negative, or $\partial r/\partial T_i < 0$; if tax rate in a country is set higher (lower), price of capital is lowered (raised). With recognition of this relationship, the residents set the weight a_i that policy maker faces. As well, the residents recognize that the tax rate is high when the policy makers act as the tax-revenue-maximizing government, compared to the

case where they act as a benevolent government. Now, with these effect and recognition of residents, we can give interpretations to the equilibrium in each area of Figure 1, one by one.

In area A, substantial amount of capital is owned by absentee owners. This implies that residents of both country take a position of capital-importer and prefers to lower price of capital. In order to do so, they have an incentive to choose a policy maker, who set a high tax rate. As a result, Leviathan-type governments, or tax-revenue-maximizing government, are chosen in both of the two countries.

In area D and E, large amount of capital is owned by non-absentee owners, but there exists a huge gap in the initial endowment of capital between the two countries. If a country is endowed with more (less) capital than the other country is, the country becomes a capital-exporting (-importing) country, that is, the amount of capital employed in the country in equilibrium is less (more) than the amount of capital endowed initially. In this case, the government of capital-exporting (-importing) country has an incentive to set a low (high) capital tax rate to raise (lower) price of capital in the market. Therefore, when the asymmetry in capital endowment is sufficiently large, capital-exporting (-importing) country is likely to choose to behave as a benevolent (Leviathan) government.

Finally, in area B, there also exists the asymmetry between the countries and capital inflows (outflows) into (from) a country due to it, except for when $\theta = 1/2$. However, these are not so large enough to cause residents of both countries to choose Leviathan government for purpose of controlling the terms-of-trade, or capital price in the market through their tax rates. Hence, benevolent governments are chosen by the residents of both countries, so as to straightforwardly maximize their utilities.

In addition, we could refer to which areas are inefficient as a result of the game, by comparing payoffs in each case. In shaded areas in Figure 1, the results are inefficient, or there exists room for pareto improvement.

4 Extension

4.1 Moderate Leviathan

So far, we have restricted our analysis to the two opposite cases: the Leviathan ($a_i = 1$) and the benevolent government ($a_i = 0$). We here mention the possibility that the moderate Leviathan prevails. Edwards and Keen (1996) and Wrede (1998) among others assume fiscal competition among *moderate* Leviathans,

which are neither entirely benevolent nor self-serving. This corresponds to the case that a_i takes an interior solution in our model.

Substituting (6) and (9)-(11) into (5), we get $U_i = c_i(a_i, a_j)$. A maximization of U_i with respect to a_i in the first stage produces the reaction function:

$$a_i = (a_j + 1)\,\frac{(\delta\theta_j - \delta\theta_i + 1)\,a_j + (2 - \delta\theta_j - 3\delta\theta_i)}{(3\delta\theta_i + \delta\theta_j + 1)\,a_j + (7\delta\theta_i - \delta\theta_j + 2)}. \tag{16}$$

For clarity, we assume that the two countries are symmetric: $\theta_1 = \theta_2 = 1/2$. Consequently, we have government equilibrium type in the first stage as follows:

$$a_1 = a_2 = \frac{1-\delta}{2\delta}. \tag{17}$$

From (17), we confirm that the residents choose the Leviathan-type policy maker ($a_i = 1$) if δ is sufficiently small ($\delta \leq 1/3$) and the benevolent government ($a_i = 0$) if $\delta = 1$, respectively. In addition to these opposite cases, (17) shows that the residents have incentives to choose the moderate Leviathan if $\delta \in (1/3, 1)$. In any case, the policy-target of the government set by the residents depends on the form of capital ownership, denoted by δ, which is what this study proves in the above propositions.

4.2 Public Goods

The results of the previous section follow the assumption that all tax revenues are returned to the residents as a lump-sum transfer. This assumption follows the literature and is made for tractability, which allows us to derive closed-form solutions for equilibrium tax rates. Specifically, this is a useful approach to clarify the effects on the choice of government's objective of terms of trade associated with capital ownership [Ogawa (2013), Kempf and Rota-Graziosi (2015), and Hindriks and Nishimura (2015)].

In this section, we extend our model to incorporate more general formulations of preferences with public goods, which may introduce familiar fiscal externalities. Still, in rather general analysis, we here show that the equilibrium objective of the governments would depend on the pattern of capital ownership.

The preference of citizens in country i is now defined by

$$U(c_i, g_i) = c_i + (1 + \gamma)g_i, \tag{18}$$

where c_i is the consumption of a private numeraire good and g_i the public good. In (18), $\gamma \geq 0$ is a preference parameter reflecting the strength for public goods:[7]

[7] $1 + \gamma$ can be also interpreted as the marginal costs of public funds in the country. See Cardarelli et al. (2002), Bucovetsky (2009), Keen and Konrad (2013), and Eichner (2014).

If $\gamma = 0$, the model reduces to that of the previous section, and the formulation places a limit on our results presented in Section 3 if $\gamma > 0$. To understand how and why our results are modified intuitively, we simplify our model by assuming that there is no absentee capital owners, i.e., $\delta = 1$.

Under the modified utility function, the second-stage equilibrium tax rates are obtained as $T_i = T_i(a_i, a_j; \theta_i, \theta_j, \gamma)$. Substituting the equilibrium values into $k_i(T_i, T_j)$ and $r(T_i, T_j)$ and setting $\theta_1 = \theta$ and $\theta_2 = 1 - \theta$, we have the utility levels in the first stage; $U_i(a_i, a_j; \theta, \gamma)$. the comparsion of utilities yield:

$$U_i(0,0) \gtrless U_i(1,0) \quad \leftrightarrow \quad \theta \gtrless \frac{(\gamma+1)(3\gamma+1)(24\gamma+24\gamma^2+5)}{2(106\gamma+151\gamma^2+72\gamma^3+25)} \tag{19}$$

$$U_i(0,1) \gtrless U_i(1,1) \quad \leftrightarrow \quad \theta \gtrless \frac{40\gamma+24\gamma^2+17}{2(28\gamma+23)} \tag{20}$$

$$U_j(0,0) \gtrless U_j(0,1) \quad \leftrightarrow \quad \theta \lessgtr \frac{45-72\gamma^4-24\gamma^3+167\gamma^2+168\gamma}{2(106\gamma+151\gamma^2+72\gamma^3+25)} \tag{21}$$

$$U_j(1,0) \gtrless U_j(1,1) \quad \leftrightarrow \quad \theta \lessgtr \frac{29+16\gamma-24\gamma^2}{2(28\gamma+23)} \tag{22}$$

By comparing utilities, we obtain the SPEs of the game, which are depicted in Figure 2.

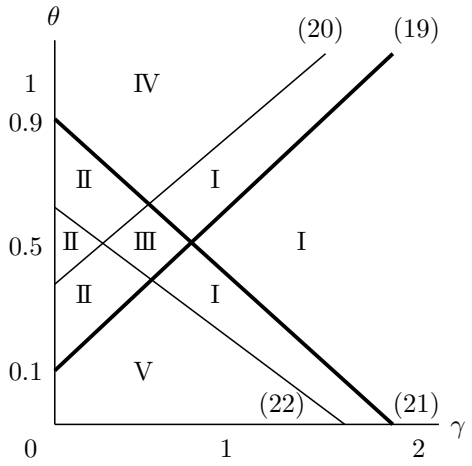

Figure 2. Equilibrium Classification with Public Goods

Note. In area I, the equilibrium is $(1, 1)$, meaning that $a_1 = 1$ and $a_2 = 1$. In this case, two governments act as Leviathans; In area Ⅱ, the equilibrium

is $(0,0)$, meaning that $a_1 = 0$ and $a_2 = 0$. In this case, two governments act benevolent; In area IV, the equilibrium is $(0,1)$, meaning that $a_1 = 0$ and $a_2 = 1$. In this case, country 1 acts as the benevolent government and country 2 acts as Leviathan, and $(1,0)$ vice versa in area V. In area III, there are two equilibrium: $(1,0)$ and $(0,1)$.

When $\gamma = 0$, we have three equilibria, (1,0), (0,0), and (0,1), depending on θ, which have been also shown in Figure 1 with $\delta = 1$. Our extension including public goods shows that the residents are likely to choose Leviathan-type government's objective as they put more weight on the public goods.

This is simply because, in addition to the incentive to manipulate the capital price that has been focused in the previous sections, now the governments have incentive to control the level of public goods and under-utilize their capital tax in the public good model. As is well-known in the literature, country i raising revenue with a capital tax causes an outflow of capital, which increases the tax bases of other countries. However, country i does not account for its effects of capital tax on the tax revenue, and thereby residents' utilities in other country. This suggests that the tax increase in country i generates positive fiscal externality, meaning that the public goods are undersupplied. As γ increases the residents have more incentives to avoid the undersupply of public goods, inducing them to choose the Leviathan-type policy-makers who prefer to choose high tax rate. In contrast, when γ is sufficiently low, the incentive to manipulate the capital price is still dominant, and therefore, the residents in capital-exporting country choose the benevolent-type of government and those who live in capital-importing country choose the Leviathan-type policy maker.

5 Concluding Remarks

This study reexamines the issue of endogenous objective of governments in tax competition. Pal and Sharma (2013) argue that SPEs correspond to the unique equilibrium in which governments maximize the net tax revenue, implying that the standard equilibrium under the welfare-maximizing governments is not commitment robust. By generalizing the form of capital ownership, we show that the equilibrium pattern derived by Pal and Sharma prevails if most of the capital is owned by absentee capital owners. Our research further shows that if the country's residents own most of the capital, as assumed in the conventional tax competition studies, the equilibrium outcome is reduced to a tax competition among welfare-maximizing governments. Furthermore, extending the model by departing from the binary choice of the objective, we suggest the possibility of

the moderate Leviathan, in which policy-makers are neither entirely benevolent nor fully self-interested.

The paper shows that the policy-target of the government determined by the welfare-maximizing residents depends on the form of capital ownership and is derived within the context of a model that follows the literature, but depends on less general assumptions. One of such assumptions is the model is restricted to the case of two countries. A model with $n(>2)$ countries can be formulated, and in such a case, the governments are more likely to behave benevolent since the larger the number of countries, the less each government can manipulate the terms of trade, thus giving less incentive for the residents to motivate the policy-maker to deviate from welfare-maximization.

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