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Strategic Delegation in Asymmetric Tax Competition

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Abstract

This study examines asymmetric tax competition under representative democracy systems. The findings show that the degree of asymmetry between countries affects the result of elections in each country, where the citizens select a policymaker to set a tax rate for the country. In particular, under certain conditions, a decisive voter in the election can select a citizen whose share of the country's capital is higher than the decisive voter's own share.

Keywords: Tax competition; Strategic delegation; Terms of trade

JEL classification D72, H30, H87

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1 Introduction

Under representative democracy that is found in several Western countries, citizens seriously consider which candidates to vote for, because they know it will influence the policies implemented after the election. Representative democracy, as a collective decision-making system, is thought to work well to govern our societies and to be irreplaceable by any other political regimes. Social structures worldwide, however, are undergoing significant changes such as the sharp increase in the mobility of capital, goods, and workers. These changes are often a result of globalization, which also influences the features and validity of decision-making in a representative democracy (Rodrik, 2012). One of the features of the growth of globalization throughout the world is market integration; tax competition theory is an important strand in analyzing market integration. This theory has a long history dating back at least to Zodrow and Mieszkowski (1986) and Wilson (1986). Curiously, however, in the literature on tax competition, the issues of representative democracy and political competition have largely been left out. Therefore, the impact of increasing globalization on the consequences of elections and formulation of public policies is less well understood.¹

Recently, however, Ihuri and Yang (2009) incorporated the stylized form of representative democracy with citizen candidates into the canonical model of tax competition.² As a part of their findings, they show that in *symmetric* tax and political competition, a decisive voter in the election tends to delegate the authority to set the tax rate to a poor citizen, or a citizen whose capital share is lower than that of the decisive voter.

In this study, we focus on examining who is selected as a policymaker in an *asymmetric* tax competition setting.³ Rapid globalization has led to fiscal competition among non-homogeneous countries, and tax competition theories recognize the analytical importance of considering regional heterogeneity, at least since Bucovetsky (1991).

¹Although the issue of strategic delegation under representative democracy, which is the main subject of our study, has not been explored much in the literature, the effects of policy setting in a direct democracy, that is, a simple median voter model, have been studied intensively. See, for instance, Fuest and Huber (2001), Borck (2003), Grazzini and Van Ypersele (2003), and Lockwood and Makris (2006) among others.

²Though few studies deal with tax competition under strategic delegation, there are two exceptions. In the early stage, Brückner (2001) introduces the strategic delegation approach into the tax competition model to examine the effects of tax coordination. Pal and Sharma (2011) study strategic delegation under Stackelberg tax competition and show that political delegation takes place only in the follower country, not in the leader country.

³It is fair to mention that Ihuri and Yang (2009) use the symmetric model of tax and political competition to explore the implications for efficient provision of public goods. Therefore, the selection of a policymaker is not their major concern.

The introduction of regional heterogeneity brings about a change in equilibrium characteristics. For example, in asymmetric tax competition with strategic delegation, there are three types of equilibrium. In one of the two countries, for the decisive voter, the following may hold: (i) the authority to make policies is delegated to the rich in the election; (ii) the authority is delegated to the poor; or, (iii) the decisive voter picks him/herself as the policymaker. Conversely, in the other country, the decisive voter always chooses the poor in equilibria. The distinction among the three equilibria is because of the degree of asymmetry between the two countries. Particularly, if the regional asymmetry is higher than a certain level, it leads to type (i) equilibrium, a finding that differs noticeably from those of Ihuri and Yang (2009) for the symmetric world.

The terms of trade between a capital-exporting and capital-importing country in tax competition plays a key role in creating the critical difference from Ihuri and Yang's (2009) results. When capital crosses national borders, the asymmetric countries have incentives to manipulate their terms of trade (Bond and Samuelson, 1989; Gordon, 1992). This is because capital importers, in general, prefer a lower capital price so that their payment for borrowings is reduced, whereas capital exporters prefer a higher capital price, so as to receive higher returns from their investment. Thus, asymmetric countries face conflicts with regard to the price of capital and they try to manipulate the capital price by using capital tax/subsidy instruments. Whereas standard tax/subsidy competition is motivated by the attraction of mobile tax bases, for example, capital for public goods provision, the incentives to manipulate the terms of trade also lead governments to alternative forms of capital tax/subsidy competition (DePater and Myers, 1994; Eggert, 2000; Itaya et al., 2008; Ogawa, 2013).

Whereas our study is motivated by Ihuri and Yang (2009), another closely related study is Persson and Tabellini (1992) that develops a somewhat different tax competition model from ours.⁴ In their model, there exist two countries with different tax rates. Depending on the position of the median voter in each country, one country chooses a low capital tax rate and the other chooses a high tax rate. The tax rate differential in the integrated capital market causes capital flows. Furthermore, the median voter in the capital-importing country has an incentive to delegate the right to choose the tax rate to the poor, because the poor prefer a higher tax rate to meet redistribution objectives. The high tax chosen by the poor can help to reap the rents of foreign investors. The median voter in the capital-exporting country has the opposite incentive; that is, he/she might delegate the right to set the tax rate to the rich, who have

⁴Persson and Tabellini (1994) compare the outcomes between representative democracy and direct democracy by using the same framework.

incentives to choose a lower tax rate, because this tax rate would help to guard against capital outflow.

The critical difference in our study from Persson and Tabellini (1992, 1994) is the incentive for delegation. They describe an incentive for delegation that is based on the manipulation of tax-exporting effects. That is, the delegation of the right to set a tax rate to the rich or poor depends on how the countries can reap the rent of absentee taxpayers. In contrast, we focus on how the terms of trade affect the incentive for delegation. This variation in the mechanism for delegation produces a different result; in Persson and Tabellini (1992, 1994), delegation to the rich may occur in the high-tax country, but in our study, it appears in the low-tax country.

This paper is organized as follows. In the next section, we develop a model in which the two countries are asymmetric in production technology; a citizen-candidate election to determine a policymaker takes place in each country before tax competition begins. The equilibria of our model are presented in Section 3, and the main results are presented in Section 4. In Section 5, we provide a discussion of the shift from direct to representative democracy from the perspective of tax competition. In Section 6, we present the conclusions of our study and discuss the limitations and areas of further research .

2 The model

The model constructed here follows that of Ichori and Yang (2009) that considers a two-stage game, similar to Besley and Coate (2003). These models originate from the citizen-candidate models by Osborne and Slivinski (1996) and Besley and Coate (1997). In the first stage, a simple-majority election takes place in each country to pick a citizen as a policymaker. This policymaker governs the country and determines a tax rate in the next stage. In the second stage, tax policies are selected simultaneously by the individuals elected as policymakers in both countries. We solve this game backward to determine the equilibrium.

The economy consists of two countries, $i = S, L$; their population sizes are denoted by N_i . Individuals in each country have the same claim to labor, but unequal claims to capital. The initial amount of capital owned by individuals in country i is given by \bar{K}_i . An individual j in country i has $\theta_{ij}\bar{k}_i$ units of capital as an initial endowment, where \bar{k}_i is the amount of average capital in country i , $\bar{k}_i \equiv \bar{K}_i/N_i$, and $\theta_{ij}(\geq 0)$ represents the deviation from the average. If individual j is not endowed with initial capital, $\theta_{ij} = 0$. Correspondingly, if individual j 's initial capital endowment is just equal to the average (\bar{k}_i), $\theta_{ij} = 1$, implying that $\theta_{ij} > 1$ if individual j has more capital, as compared

to the average. Because positively skewed distributions of income are often observed in practice, we assume that the median claim to capital in a country is smaller than the mean (average) claim in this model, that is, $\theta_{iM} < 1$, where θ_{iM} denotes the position of the median in country i . At this stage, however, we do not exclude $\theta_{iM} \geq 1$.

In each country, perfectly competitive firms produce numeraire private goods with CRS technology, using labor and capital, $F_i(K_i, N_i) = (A_i - (K_i/N_i))K_i$. This can be rewritten based on the per labor term as $f^i(k_i) = (A_i - k_i)k_i$, where k_i represents the capital per labor employed in country i and A_i , the country-specific parameter, stands for the productive efficiency of firms.⁵ We assume that $\Lambda = A_L - A_S > 0$, without loss of generality.⁶ To concentrate on a single source of regional asymmetry, we assume $\bar{K}_i = \bar{K}$ and $N_i = N$; therefore, $\bar{k}_i = \bar{k}$ in the following analysis. In this case, the total amount of capital employed for production in this economy is $2\bar{K}$.

Each government levies a unit tax at rate T_i on mobile capital employed within the country. Perfect mobility of capital between countries and the capital-market clearing conditions imply

$$r = f_k^i(k_i) - T_i, \quad (1)$$

$$2\bar{k} = k_L + k_S, \quad (2)$$

where r is the price of capital. Using (1) and (2), we have the amount of capital in country i and the price of capital as follows:

$$k_i = \bar{k} + \frac{A_i - A_{-i} - T_i + T_{-i}}{4}, \quad (3)$$

$$r = \frac{\Omega}{2} - \frac{4\bar{k} + T_L + T_S}{4}, \quad (4)$$

where $\Omega \equiv A_L + A_S$. Let the preference of an individual j in country i be $u(c_{ij}) = c_{ij}$, where c_{ij} represents the individual's consumption of the private good. The individual's income is composed of labor income, $f^i(k_i) - f_k^i(k_i)k_i$; rent from capital, $r\theta_{ij}\bar{k}$; and a lump-sum transfer from the government of the country, g_i . Hence, the consumer's budget constraint is given by

⁵The quadratic function has a nice feature that enables us to obtain outcomes in an explicit form, and thus has been used in Bucovetsky (1991), Wildasin (1991), Peralta and Van Ypersele (2005), Itaya et al. (2008), and Kempf and Rota-Graziosi (2010), among others.

⁶The method used to express the regional differential in technology does not affect the main result of this study, but the coexistence of capital importing and exporting countries is crucial. Therefore, we express the regional asymmetry in terms of A_i , because this produces a simpler and more efficient expression.

$$c_{ij} = f^i(k_i) - f_k^i(k_i)k_i + r\theta_{ij}\bar{k} + g_i. \quad (5)$$

As each government finances the lump-sum transfer with a tax on capital, the government's budget constraint is given by

$$g_i = t_i k_i. \quad (6)$$

Using (1), (5), and (6), the utility function can be written as $u(c_{ij}) = f^i(k_i) + r(\theta_{ij}\bar{k} - k_i)$. This implies that the utility is composed of the gross national product per capita and the net income from capital investment. With this assumption, we can create the situation in which manipulation of the terms of trade is the sole incentive to use the capital tax (Peralta and Van Ypersele, 2005; Itaya et al., 2008; and Ogawa, 2013).

3 Equilibrium

The timing of the game is defined as follows.

1. In each country, a policymaker is elected from among the citizens through a majority voting. The authority to choose the capital tax rate in the country is delegated to this policymaker.
2. Tax rates T_i are determined simultaneously and independently by the policymaker for each country.

Because the concept of a sub-game perfect Nash equilibrium is applied, we solve the model backward.

3.1 Second Stage: Tax competition

Let the policy-maker in country i have $\theta_{iP}\bar{k}$ units of capital. Given a tax rate in the other country, T_{-i} , the policymaker determines the tax rate in his/her country by solving the following maximization problem:

$$\begin{aligned} \max_{T_i} \quad & u_{iP} = (A_i - k_i)k_i + r(\theta_{iP}\bar{k} - k_i), \\ \text{s.t.} \quad & (3) \text{ and } (4). \end{aligned}$$

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

$$T_i(T_{-i}) = \frac{1}{3}T_{-i} + \frac{4\bar{k} - 4\bar{k}\theta_{iP} + A_i - A_{-i}}{3}. \quad (7)$$

Solving (7) for $i = S, L$, we obtain the tax rate of country i in the equilibrium of the following sub-game:

$$T_i = \frac{8\bar{k} - 6\bar{k}\theta_{iP} - 2\bar{k}\theta_{-iP} + A_i - A_{-i}}{4}. \quad (8)$$

Substituting (8) into (3)-(4), the equilibrium values are yielded as follows:

$$k_i = \bar{k} + \frac{2\bar{k}\theta_{iP} - 2\bar{k}\theta_{-iP} + A_i - A_{-i}}{8}, \quad (9)$$

$$r = \frac{\Omega + 2\bar{k}\theta_{LP} + 2\bar{k}\theta_{SP} - 8\bar{k}}{2}. \quad (10)$$

3.2 First Stage: Voting in the election

A simplified process of representative democracy is applied in this model, where each citizen in a country is a candidate who can be selected as a policymaker and has a right to vote on this decision as well. Thus, we have two questions to be answered: (i) who is the decisive voter of the selection? and (ii) who is selected as the policymaker to determine the capital tax rate of the country? These questions are addressed in order in the next subsections.

3.2.1 Who becomes the decisive voter?

The citizens of each country do not vote on a tax policy directly; they vote for an individual based on the amount of capital owned by him/her. Therefore, we need to show that citizens' preferences exhibit single-peakedness over θ_{ij} . From the second-order condition, $\partial^2 u_{ij} / \partial T_i^2 < 0$, the single-peakedness of an individual's preference over the tax rate is confirmed. Once a citizen in country i is selected as a policymaker, he/she chooses a tax rate in accordance with (7). Thus we can assure that T_i determined by the policymaker of each country is negatively monotonic in θ_{ij} . This implies that the more capital a policymaker has, the lower the tax rate he/she chooses. This fact induces single-peakedness of citizens' preferences over θ_{ij} .

From the induced single-peaked preference over θ_{ij} , it follows that if a citizen with $\theta_{ij}\bar{k}$ units of capital prefers a candidate who has the initial amount of capital $\theta'_{ij}\bar{k}$ over a candidate who has $\theta''_{ij}\bar{k}$, where $\theta'_{ij} < \theta''_{ij}$, then all citizens who have a smaller amount of capital than $\theta_{ij}\bar{k}$ must agree with the citizen having $\theta_{ij}\bar{k}$, and vice versa. This means that a citizen who is located at the median of the distribution of capital share is the decisive voter in his/her country, and thus, he is a Condorcet winner of this political decision process.

3.2.2 Who becomes the policy maker?

To whom does the median voter in the country delegate the tax-rate setting authority? Let the median voter of country i have $\theta_{iM}\bar{k}$ units of capital. Taking the equilibrium values of the sub-game at the next stage into consideration, the median voter confronts a maximization problem to determine a policymaker as follows:

$$\begin{aligned} \max_{\theta_{iP}} \quad & u_{iM} = (A_i - k_i)k_i + r(\theta_{iM}\bar{k} - k_i), \\ \text{s.t.} \quad & (9) \text{ and } (10). \end{aligned}$$

The first-order condition of each country's decisive voter yields the following reaction function,

$$\theta_{iP}(\theta_{-iP}) = \frac{1}{5}\theta_{-iP} + \frac{16\bar{k}\theta_{iM} - 8\bar{k} - A_i + A_{-i}}{10\bar{k}}. \quad (11)$$

From (11), in the sub-game perfect Nash equilibrium of this game, the policymaker of each country, selected by the median voter, is characterized by the amount of capital as follows:

$$\theta_{iP}^* = \frac{20\bar{k}\theta_{iM} + 4\bar{k}\theta_{-iM} - 12\bar{k} - A_i + A_{-i}}{12\bar{k}}. \quad (12)$$

The tax rate, the amount of capital, and the capital price in the equilibrium are respectively given as follows:

$$T_i^* = \frac{4(3 - \theta_{-iM} - 2\theta_{iM})\bar{k} + (A_i - A_{-i})}{3}, \quad (13)$$

$$k_i^* = \bar{k} + \frac{(A_i - A_{-i}) + 4\bar{k}(\theta_{iM} - \theta_{-iM})}{12}, \quad (14)$$

$$r^* = \frac{\Omega}{2} - 2\bar{k}(3 - \theta_{LM} - \theta_{SM}). \quad (15)$$

Before explaining the equilibrium outcome in detail, we make an assumption. In the strategic delegation game presented above, from (14), it is straightforward to verify that the following assumption guarantees nonnegative levels of capital.

Assumption 1. $-4(3 + \theta_{LM} - \theta_{SM}) < \Lambda/\bar{k} < 4(3 - \theta_{LM} + \theta_{SM})$

If Assumption 1 is violated, all capital flows to either of the two countries, and the other country becomes inactive.

4 Selected Policymaker

4.1 Is the policy maker rich or poor?

By examining who is elected as the policymaker of each country through the strategic delegation process, we answer the question of whether this person owns a higher or lower capital share than the median citizen of the society. From (12), the capital shares of the median voter and the policy-maker in each country can be compared as follows:

$$\theta_{LP}^* - \theta_{LM} = \frac{2\theta_{LM} + \theta_{SM} - 3}{3} - \frac{\Lambda}{12\bar{k}}, \quad (16)$$

$$\theta_{SP}^* - \theta_{SM} = \frac{2\theta_{SM} + \theta_{LM} - 3}{3} + \frac{\Lambda}{12\bar{k}}. \quad (17)$$

In the following analysis, because the evidence shows that the income distribution is skewed to the right, we begin by analyzing the equilibrium characteristics in the case of $\theta_{iM} \in [0, 1)$, deferring discussion of other cases until later.

In (16) and (17), the first term on the right-hand side is strictly less than zero when $\theta_{iM} \in [0, 1)$. The second term captures the effect of asymmetry between the countries. Leaving this asymmetric effect out of consideration, the median voter always chooses a citizen whose capital share is lower than his/her own share, that is, $\theta_{iP}^* < \theta_{iM}$ for $i = S, L$ when $\Lambda = 0$. This is also what Ihori and Yang (2009) point out in their setting of symmetric countries. Meanwhile, the asymmetry of the countries denoted by $\Lambda (= A_L - A_S > 0)$ in this model influences the choice of policymaker by the median voter in each country, particularly in country S . The effects of regional asymmetry are summarized in the following propositions.

Proposition 1. *Assume that the income distribution is right-skewed, that is, $\theta_{iM} \in [0, 1)$. The decisive voter in country L delegates the power to set the tax rate to the poor. The larger the magnitude of asymmetry (Λ) is, the lower is the policymaker's capital share, as compared to that of the citizen at the median of the capital distribution in the country.*

Proof. From (16), $\theta_{LP}^* < \theta_{LM}$ for all $\theta_{iM} \in [0, 1)$.

Proposition 2. *Assume that the income distribution is right-skewed, that is, $\theta_{iM} \in [0, 1)$. The delegation in country S is characterized as follows.*

Delegation to the poor: When $\Lambda < 4\bar{k}(3 - 2\theta_{SM} - \theta_{LM})$, the capital share of the policy-maker is lower than that of the citizen at the median of the capital distribution in the country.

Delegation to the median voter himself/herself: When $\Lambda = 4\bar{k}(3 - 2\theta_{SM} - \theta_{LM})$, the citizen at the median votes for himself/herself.

Delegation to the rich: When $\Lambda > 4\bar{k}(3 - 2\theta_{SM} - \theta_{LM})$, the capital share of the policymaker is higher than that of the citizen at the median of the capital distribution in the country.

Proof. See (17).

In country L , the gap between the capital share of the median citizen and the policymaker is obviously widened with an increase in Λ . On the other hand, in country S , this gap becomes narrower; it can be narrowed to zero, in which case the median citizen votes for himself/herself to set the tax rate. Furthermore, the arithmetic magnitude of the values can be reversed. When the asymmetry illustrated by Λ is significantly large to satisfy $\Lambda > 4\bar{k}(3 - 2\theta_{SM} - \theta_{LM})$, the median citizen as the decisive voter chooses a candidate whose capital share is higher than his/her own share.

Figure 1 is a graphical representation of our main results under Assumption 1, in which $\theta_M \equiv \theta_{SM} = \theta_{LM}$ is assumed in order to facilitate visualization. In the range of $\theta_{iM} \in [0, 1)$, the decisive voter in country L always delegates the right to set the tax rate to the poor; in country S , however, it may be delegated to the rich if Λ/\bar{k} is large.

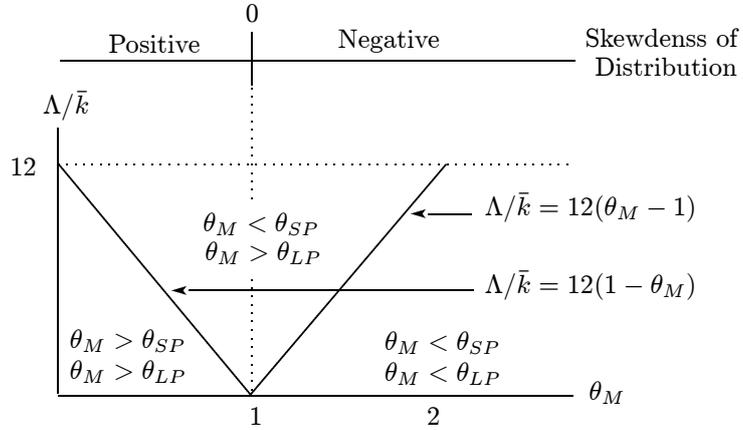


Figure 1. Equilibrium classification

Note. $\theta_{LM} = \theta_{SM} = \theta_M$ is assumed for simple visualization. $\Lambda/\bar{k} < 12$ under Assumption 1.

4.2 What lies behind the decisive voter's choice of policymaker?

In this section, we provide an intuitive interpretation of the results. A key concept for this interpretation is the terms of trade between the capital importer and exporter. Interestingly, although country S exports capital at the national level, a resident who imports capital at the individual level exists; he/she can be a decisive voter in the election under certain conditions.

To explain the intuition behind the variation from the case of two symmetric countries presented by Ihuri and Yang (2009), we start our explanation with $\Lambda = 0$. Figure 2 illustrates the reaction and indifference curves when $\Lambda = 0$. R_i^{med} depicts the reaction curve of the median voter in country i , if the citizen at the median picks himself/herself as the policymaker. When this policymaker sets the tax rate in the second stage, the equilibrium tax rates are represented by point E_M , the intersection of R_L^{med} and R_S^{med} . The utility of the median voter in country i at point E_M is given by the indifference curve displayed as \bar{u}_i^{med} . Recognizing that the median voter obtains the utility level represented by \bar{u}_i^{med} when he/she chooses the tax rate, he/she is aware that his/her utility would increase if the authority to choose the tax rate was delegated to others. To further explain the median voter's incentive to delegate authority in Figure 2, we take the median voter's choice in country L as an example. Note that the median voter of country $L(S)$ gains higher utility as the indifference curve moves upward (to the right). The median voter in country L understands that given the median voter's choice in country S , R_S^{med} , he/she can get higher (and maximum) utility if he/she delegates the right to set the tax rate to the individual who chooses point E_L , where R_S^{med} is tangential to \bar{u}_L^{med} . In Figure 2, R_L^{pol} represents the reaction curve of the individual who is chosen as the policymaker in the first-stage election. Considering the negative monotonicity of T_i in θ_{ij} , the location of R_L^{med} and R_L^{pol} means that the median voter chooses a citizen, whose capital share is lower than that of the median voter himself/herself, as a policymaker.

By doing so, the median voter can avoid an excessively low tax rate that could have been realized in the Prisoner's-dilemma-like equilibrium from the tax competition at the second stage. As the median voter in country S acts in the same manner as the median voter in country L , the sub-game perfect Nash equilibrium is represented by point E_P , where the median voters can obtain higher utility than at point E_M . In other words, median voters take advantage of the structure of representative democracy-policymakers have to set a policy ex post, or after election, taking the policy of the other country as given, whereas voters can evaluate a policy ex ante, or before election. Hence, the median voter

strategically delegates to others, in particular, to the poor, and does not select himself/herself as the policymaker.

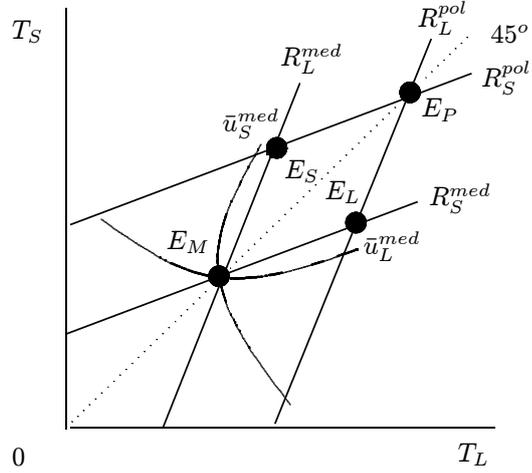


Figure 2. Reaction curves and indifference curves when $\Lambda = 0$.

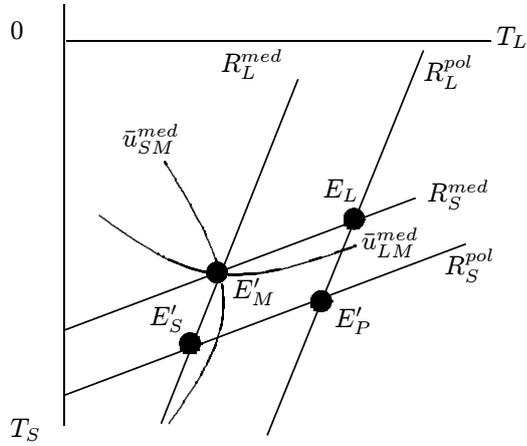


Figure 3. Reaction curves and indifference curves when $\Lambda > 12\bar{k}(1 - \theta_M)$ and $\theta_{SM} = \theta_{LM} \equiv \theta_{iM} \in [0, 1)$.

From the above-mentioned ideas, the reason for the median voter in country L to delegate to a citizen whose capital share is lower than in a symmetric

setting is quite straightforward. For simplicity, and without loss of generality, assume $\theta_{iM} = \theta_{jM} = \theta_M$. In this case, country $L(S)$ imports (exports) capital; $\bar{k} - k_L^* = -\Lambda/12 < 0 < \bar{k} - k_S^* = \Lambda/12$. Under Assumption 1, the median voter in capital-importing country L is a net capital importer as well; $\theta_M \bar{k} - k_L = -12(1 - \theta_M) - \Lambda/\bar{k} < 0$. The position of the median voter in country L as a net capital importer leads him/her to delegate the right to set the tax rate to the individual who has less capital than he/she has. This is because, given the decisions made in country S , a tax increase in country L will reduce the price of capital (see (4)). This will reduce the cost of capital borrowing and benefit the median voter. From (13), the median voter recognizes that the poor prefers a higher tax rate; thus, if the median voter delegates the right to set the tax rate to the individual who has less capital than the median voter, he/she benefits from the higher tax rate, and thereby, the lower capital price. That is, the median voter in country L delegates the right to set the tax rate to the poor so as to reduce the capital price, and thereby, the interest payment for capital borrowing. This delegation is captured by two reaction curves, R_L^{med} and R_L^{pol} in Figure 3, where R_S^{med} is the tangential to \bar{u}_{LM}^{med} at E_L .

In contrast, the median voter in country S turns out to be either a net capital importer or exporter. Notice that the following relation holds in the equilibrium.

$$\Lambda \underset{>}{<} 12\bar{k}(1 - \theta_M) \Leftrightarrow \theta_{SM}\bar{k} \underset{>}{<} k_S^*. \quad (18)$$

(18) reveals that, when $\Lambda < 12\bar{k}(1 - \theta_M)$, the median voter in country S behaves as if he/she were a net capital importer and has an incentive to reduce the capital price; whereas country S , as a whole, exports capital in the asymmetric setting. Thus, in the election, the median voter chooses a poor citizen, or a citizen who owns a lower share of capital than he/she does, as shown in Figure 2. Meanwhile, when Λ is larger so as to satisfy $\Lambda > 12\bar{k}(1 - \theta_M)$, the median voter picks a richer citizen than himself/herself. A key of this result is that the median voter himself/herself is a net capital exporter at a personal level. Figure 3 shows the equilibrium when the regional asymmetries are significant: $\Lambda > 12\bar{k}(1 - \theta_M)$, in which the U-shaped indifference curve of the median voter in Figure 2 is inverted; the utility level becomes higher as the indifference curve moves left. Taking R_L^{med} as given, the median voter picks that citizen as a policymaker, whose capital share is higher than the median voter's own share, so that the selected policymaker chooses a lower tax rate, leading to E'_S . Strategic delegation made in the first stage in the two countries results in the inferior outcome that is represented by point E'_P in Figure 3.

Overall, the distribution of capital plays a key role in determining whether

the median voter delegates the right to set the tax rate to the rich or poor. Whether a rich or poor candidate is elected as the policymaker depends on the magnitude of asymmetry between the countries.

So far, we have considered the case of $\theta_{iM} \in [0, 1)$ that fits with the positively skewed income distribution. In closing this section, we mention the other cases. Although there is a low possibility of its appearance, the negatively skewed distribution with $\theta_{iM} > 1$ may result in the outcome that the rich are elected as policymakers in both countries (see Figure 1). This can be interpreted in a similar manner. When θ_{iM} is sufficiently large in both countries, the median voter in country L , as well as in country S , is positioned as the net capital exporter. This position gives him/her the incentive to delegate the right to set the tax rate to the rich, because he/she benefits from the higher capital income when the rich choose a lower tax rate, because that results in a higher price of capital. Using (16) and (17), we can summarize the above argument as follows.

Proposition 3. *Assume that the income distribution is left-skewed, $1 \leq \theta_{iM}$. The decisive voter in country S delegates the power to set the tax rate to the rich. The larger the magnitude of asymmetry (Λ) is, the higher is the capital share of the policymaker, as compared to that of the citizen at the median of the capital distribution in the country.*

Proposition 4. *Assume that the income distribution is left-skewed, $1 \leq \theta_{iM}$. The delegation in country L is characterized as follows.*

Delegation to the rich: When $\Lambda < 4\bar{k}(2\theta_{LM} + \theta_{SM} - 3)$, the capital share of the policymaker is higher than that of the citizen at the median of the capital distribution in the country.

Delegation to the median voter himself/herself: When $\Lambda = 4\bar{k}(2\theta_{LM} + \theta_{SM} - 3)$, the citizen at the median votes for himself/herself.

Delegation to the poor: When $\Lambda > 4\bar{k}(2\theta_{LM} + \theta_{SM} - 3)$, the capital share of the policymaker is lower than that of the citizen at the median of the capital distribution in the country.

5 Discussion: A shift from direct to representative democracy

Since the era of the ancient Greek city-state of Athens, democracy has been one of the main collective decision-making systems and political regimes over the history of most of our societies. Particularly in the highly developed countries of

the modern world, few countries apply any political regime other than democracy. At some point in its long history, the original regime of direct democracy metamorphosed into representative democracy. Presently, in most cases, voting is recognized as being applicable to the choice of policymakers, not to the direct choice of policy.

Political scientists claim that representative democracy is superior to direct democracy for many reasons— in direct democracy, it is difficult to consolidate opinions and resolutions, exchange views and arguments, clearly identify who is responsible if the country is misgoverned, and so on. In other words, direct democracy costs too much to implement as a collective decision-making system. That is why the shift was made.

In addition to this reasonable explanation, our results also suggest another reason for the regime shift from direct to representative democracy. Let us explain it by adding an additional stage, namely, commitment to the form of democracy, to our model. Thus, the stage of political regime choice is added to the two-stage game we have been dealing with. The game is then composed of three stages. First, the citizens of each country vote for either keeping direct democracy or replacing it with representative democracy. Second, if representative democracy is applied as the political regime of the country in the first stage, an election is held to decide the policymaker for the country. Finally, the tax rates of each country are determined. Again, to find a sub-game perfect Nash equilibrium, we solve this game backward.

For simplicity, we assume that the distribution of capital endowment in each country is symmetric, $\theta_{LM} = \theta_{SM} = \theta_M$. In the first stage, a citizen at the median of the distribution is a decisive voter as we saw in the previous two-stage game. We denote the utility of the median voter of country i as $u_{iM}[L : regime, S : regime]$. For instance, $u_{LM}[L : dir, S : rep]$ expresses the utility of the median voter of country L when direct democracy in country L and representative democracy is applied in country S .

The median voters of both countries choose either direct or representative democracy, foreseeing the results of the second and third stages. Let us first consider the decision-making of the median voter in country L . As actions are selected simultaneously in this stage, the median voter of country L chooses the regime, taking a regime of country S as given. In the case where the regime of country S is direct democracy, the median voter in country L compares his/her utilities and picks the larger one as⁷

⁷See Appendix.

$$u_{LM}[L : rep, S : dir] - u_{LM}[L : dir, S : dir] = \frac{[8(1 - \theta_M)\bar{k} + \Lambda]^2}{320} > 0.$$

On the other hand, in a case where the regime of country S is representative democracy, he/she compares similarly as

$$u_{LM}[L : rep, S : rep] - u_{LM}[L : dir, S : rep] = \frac{17[12(1 - \theta_M)\bar{k} + \Lambda]^2}{3600} > 0.$$

Hence, shifting to representative democracy is the dominant strategy for the median voter of country L .

In the same way as for country L , we can confirm that shifting to representative democracy is also the dominant strategy for the median voter in country S :

$$\begin{aligned} u_{SM}[L : dir, S : rep] - u_{SM}[L : dir, S : dir] &= \frac{[8(1 - \theta_M)\bar{k} - \Lambda]^2}{320} > 0, \\ u_{SM}[L : rep, S : rep] - u_{SM}[L : rep, S : dir] &= \frac{17[12(1 - \theta_M)\bar{k} - \Lambda]^2}{3600} > 0. \end{aligned}$$

Remarkably, the asymmetry between the countries is not crucial for this result. Even when we assume the symmetric case, or $\Lambda = 0$, we can readily ascertain that these hold. This shows that there is a reason for representative democracy to be institutionalized in the tax-competition framework.

6 Concluding remarks

This study explored asymmetric two-country tax competition under representative democracy with citizen candidates. Under the symmetric setting, Ihuri and Yang (2009) found that the citizen who has less capital than the median citizen of the capital distribution is elected as a policymaker. By incorporating regional asymmetries in production technology, we show that the equilibrium pattern derived by Ihuri and Yang (2009) prevails if the regional asymmetries are not significant. Our extension further shows that if the regional asymmetries are significant, a citizen who is richer than the median of the capital distribution, or the decisive voter himself/herself can be elected as the policymaker to set a tax policy for the country.

A problem with our result is that it hinges on the assumption that all citizens are candidates and we can cast our votes for anyone in the society. However, the reality is quite different: whereas almost anyone who has a right to vote in

a democratic regime is also eligible to be elected a policymaker, persons who can actually be candidates in an election are limited for various reasons. In order to further strengthen our model in this study, we need to endogenize the conditions that decide who can be a candidate in an election. A few technical problems also remain. Specifically, the results of this study obviously depend on the assumption that all tax revenues are returned to the residents in a lump-sum manner. This assumption is made to determine the incentives to manipulate the terms of trade. More general formulations of preferences with public goods direct that Ihuri and Yang's (2009) result holds. Nevertheless, in a rather general analysis, the type of selected policymaker would depend on the magnitude of regional asymmetries and the equilibrium in which the rich resident is elected as a policymaker could emerge.

Appendix

In this appendix, we derive the utilities of median-voter citizens for each case below that are used in the comparison of utilities under different election schemes. As mentioned in Section 5, we assume that the distributions of capital in each country are symmetric or $\theta_{LM} = \theta_{SM} = \theta_M$.

Direct-democratized L vs. Direct-democratized S. When both countries are under direct democracy, we obtain utilities of the median voters in equilibrium as follows. Under direct democracy, a policy proposed by the median voter is applied and implemented. In other words, the median voters of each country are selected as policymakers through election and can set tax rates as they want. This means that the first stage, the voting-for-the-election stage, is practically omitted and that $\theta_{LP} = \theta_{LM}$ and $\theta_{SP} = \theta_{SM}$. Hence, using (9) and (10), the capital allocation in each country and rate of return to capital are respectively given by $k_L = \bar{k} + (\Lambda/8)$, $k_S = \bar{k} - (\Lambda/8)$, and $r = (\Omega + 4\bar{k}\theta_M - 8\bar{k})/2$. Substituting these values into the utility functions of the median voters $u_{iM} = (A_i - k_i)k_i + r(\theta_{iM}\bar{k} - k_i)$, we obtain $u_{LM}[L : dir, S : dir]$ and $u_{SM}[L : dir, S : dir]$.

Direct-democratized L vs. Rep.-democratized S. The next case is when country L is under direct democracy and country S is under representative democracy. As defined above, direct democracy in country L means $\theta_{LP} = \theta_{LM}$. On the other hand, in country S under representative democracy, the election for policymaker is held; with (11), $\theta_{SP} = \theta_{LM}/5 + (16\bar{k}\theta_{SM} - 8\bar{k} + \Lambda)/10\bar{k}$. Hence, from (9) and (10), the equilibrium values of allocation of capital in each coun-

try and rate of return to capital are, respectively $k_L = (\Lambda - 2\bar{k}\theta_M + 12\bar{k})/10$, $k_S = (-\Lambda + 2\bar{k}\theta_M + 8\bar{k})/10$, and $r = (3A_L + 2A_S + 14\bar{k}\theta_M - 24\bar{k})/5$. Substituting these values into the utility functions of the median voters, we obtain $u_{LM}[L : dir, S : rep]$ and $u_{SM}[L : dir, S : rep]$.

Rep.-democratized L vs. Direct-democratized S. In this case, country L is under representative democracy and country S is under direct democracy. Likewise, we have $\theta_{LP} = \theta_{SM}/5 + (16\bar{k}\theta_{LM} - 8\bar{k} + \Lambda)/10\bar{k}$ and $\theta_{SP} = \theta_{SM}$. Again, with (9) and (10), the equilibrium values of allocation of capital in each country and rate of return to capital are, respectively, $k_L = (\Lambda + 2\bar{k}\theta_M + 8\bar{k})/10$, $k_S = (-\Lambda - 2\bar{k}\theta_M + 12\bar{k})/10$, and $r = (2A_L + 3A_S + 14\bar{k}\theta_M - 24\bar{k})/5$. Substituting these values into the utility functions of the median voters, we obtain $u_{LM}[L : rep, S : dir]$ and $u_{SM}[L : rep, S : dir]$.

Rep.-democratized L vs. Rep.-democratized S. Finally, we consider the case we focused on in the main text, that is, both countries are under representative democracy. With (16) and (17), the equilibrium values of allocation of capital in each country and rate of return to capital are, respectively, $k_L = \bar{k} + (\Lambda/12)$, $k_S = \bar{k} - (\Lambda/12)$, and $r = (\Omega + 8\bar{k}\theta_M - 12\bar{k})/2$. Substituting these values into the utility functions of the median voters, we obtain $u_{LM}[L : rep, S : rep]$ and $u_{SM}[L : rep, S : rep]$.

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