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Abstract

This paper examined a political process and economic consequences of tax competition among asymmetric countries. Citizens are endowed with heterogeneous capital incomes. The median-voters deliberately elect a delegate whose preferences differ from their own, to pursue advantages in the international tax competition. When the countries have different productivity of the capital, the country with a low capital productivity may delegate the tax authority to a citizen who is richer than the median-voter. As a result, the outcome through strategic delegation may make the median-voters and the majority of citizens worse-off than the self-representation outcome, contrary to the previous studies with symmetric countries. Similar results are obtained when the countries differ in capital endowments. In contrast, when the countries differ in population size, productive inefficiency is reduced, and the median-voters are better-off through strategic delegation. We also point out that the role of campaign promises is important for the equilibrium tax rates and citizens' welfare.

Keywords: Capital tax competition; Strategic delegation; Asymmetric countries; Voter welfare

JEL classification: C72, D72, D78, H23, H87.

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1 Introduction

Globalization in recent years provoked more attention to the nature of international tax competition (see, e.g., Keen and Konrad (2013) for a recent review). In spite of the trend of lowering corporate income taxes for acquiring mobile capitals, there are several factors to be taken into account. First, corporate income taxes are widely based on the source principle, because it is convenient for the host country to keep the primary taxing rights to the foreign investors.[1] Second, in the presence of inequality of capital incomes, conventional political-economy analysis clarifies that motive for income redistribution matters. Using the standard tax-competition framework with intra-national inequality of capital income, this paper examines international capital allocations, the tax gap and citizens' welfare among asymmetric countries.

Countries noncooperatively decide on domestic tax policies which affect international capital flows. Therefore, in electing the policy-makers, the median-voters have to take economic and political effects into account. We assume that countries are asymmetric, either in terms of capital productivity, or population size, or capital endowments, so the preferred tax rate differs across countries. Therefore, the fiscal competition distorts productive efficiency. Domestic politics is characterized by the citizen-candidate model where citizens are endowed with heterogeneous capital incomes. We use the strategic delegation model (e.g., Persson and Tabellini (1992), Segendorff (1998)). The median-voters may deliberately elect a delegate whose preferences differ from his/her own, to affect decision-making of the other country. Alternatively, the median-voters can elect themselves, which is called self-representation, following Segendorff (1998). The comparison of the outcome under strategic delegation with that of self-representation is our main interest. Analyzing the interaction between tax competition and the direction of strategic delegation, we show that the political competition through strategic delegation may either aggravate or mitigate the productive inefficiency, depending on the type of asymmetry under consideration.

When the countries have different productivity of the capital, the country with a high capital productivity delegates the tax authority to a citizen who is poorer than the median-voter, aiming to gain higher tax revenue from the foreigners. However, the other country elects the delegate who is richer than the median-voter, when the disparity in productivity is sufficiently large, or the inequality of capital-income distribution[2] is not so high (Proposition 1). Since the direction of the preferred tax rates diverges with sufficiently large asymmetry, the outcome obtained through strategic delegation may make median-voters (and the majority of citizens) worse-off than the self-representation outcome (Proposition 2). These findings differ from previous results based on symmetric countries. The reason is because the inefficiency of capital allocation due to the tax competition —which is the focus of the asymmetric tax-competition models— is worsened by the strategic delegation.

[1] A higher foreign ownership share will generally rationalize higher source-based capital income taxes (Huizinga and Nielsen (1997), Huizinga and Nicodeme (2006)).

[2] Here, the income inequality is according to the difference between the median and the mean capital endowments (the skewness of the distribution), as in Meltzer and Richard (1981).

In contrast, when the countries differ in population size (Bucovetsky (1991), Wilson (1991)), both countries elect the delegate who wishes for higher taxes on capital than under self-representation, and the tax gap is reduced as a result of the strategic delegation. Since productive inefficiency is reduced, the median-voters are unambiguously better-off through strategic delegation (Propositions 3 and 4). When the countries differ in capital endowments (Hwang and Choe (1995), Peralta and van Ypersele (2005)), the country with the higher aggregate capital endowment, as the capital-exporting country, may delegate to a richer citizen than the median-voter. However, in this case there explicitly arises the degree of income inequality above which the direction of strategic delegation is unambiguously left to the median-voter for both countries (Propositions 5 and 6).

In the literature of the international decision-making following Persson and Tabellini (1992), strategic delegation in the domestic politics (representative democracy) is taken for granted. Instead, we highlight the role of *campaign promises*, which was not much emphasized in this literature. If the candidates in each country are committed to the most preferred tax rate at the time of election, the structure of the game is basically one-shot decision-making over the preferred taxes in each country, and there is no scope for strategic delegation. If, on the other hand, the candidates do not make binding commitments to the campaign proposal, the game has two stages: voting by citizens according to the candidates' type, and *ex post* decision-making by an elected politician. In this setting, the scope for strategic delegation arises (Lemma 3). However, in reality, the elected politicians often fulfill their campaign promises, even if they can seek strategic advantages by not making the promises (see Section 5). Our results suggest that the commitment to the campaign promises, which brings the self-representation outcome, is sometimes not only plausible but also desirable among asymmetric countries.

In this paper, unlike Persson and Tabellini (1992) and Ihori and Yang (2009), we consider various asymmetries among countries to examine international capital allocations, the tax gap and citizens' welfare.[3] On the other hand, the development of asymmetric tax competition models includes Bucovetsky (1991, 2009), Wilson (1991), Hwang and Choe (1995), Grazzini and van Ypersele (2003), Peralta and van Ypersele (2005), and Hindriks and Nishimura (2016). The main focus of these papers is the possibility of tax coordination such as the minimal tax, as well as the welfare effects of the Stackelberg tax leadership. However, none of these papers examined strategic delegation.[4] Nevertheless, our results are in line with previous results. For example, as the citizens' preference towards the Stackelberg tax competition resembles citizens' motive for strategic delegation, our Proposition 2 has an analogy to Hindriks and Nishimura's (2016) results. Also, since strategic

[3] Moreover, the focus of Ihori and Yang (2009) was the optimal number of competing countries consistent with the optimal provision of public goods. As such, strategic delegation is not indispensable in their model: their results can be replicated in a model with self-representation. Instead, we explicitly compare strategic delegation and self-representation outcomes. Gottschalk and Peters (2003) used a different model that analyzed the case where countries have different skewness of capital incomes. We can readily show the extension of our model to such a case.

[4] Exceptions are Ogawa and Susa (2014) and Pal and Sharma (2013). However, we consider a wider variety of asymmetries than Ogawa and Susa (2014), and we examine the capital allocation, the tax gap and citizens' welfare. Pal and Sharma (2013) considered a different kind of delegation (namely, the choice of the objective functions), so that the direction and the nature of the strategic delegation are different from ours.

delegation is driven by the terms-of-trade effect, it mitigates the effect of the tax-base-elasticity effect in Bucovetsky (1991, 2009) and Wilson (1991) in the asymmetric population model.

Section 2 describes the model. Section 3 solves the equilibrium under strategic delegation. Section 4 presents our main results. Section 5 discusses the role of electoral commitment. Section 6 concludes. The proofs of several propositions and lemmas are provided in the Appendix.

2 The Model

There are two countries, denoted by 1 and 2. Let $\overline{K}_i$ and $\overline{L}_i$ $(i = 1, 2)$ denote, respectively, the capital and the labor endowment in each country. Let $\overline{k}_i \equiv \dfrac{\overline{K}_i}{\overline{L}_i}$ be the per-capita capital endowment. Later we introduce possible asymmetries with respect to population size ($\overline{L}_1 > \overline{L}_2$ and $\overline{k}_1 = \overline{k}_2$) or the capital-labor ratio ($\overline{k}_1 > \overline{k}_2$ and $\overline{L}_1 = \overline{L}_2$). The former is analyzed by Bucovetsky (1991) and Wilson (1991) where country 1 has higher population, and the latter is analyzed by Hwang and Choe (1995) and Peralta and van Ypersele (2005) where country 1 has a higher capital endowment.

Capital is perfectly mobile across borders while labor is perfectly immobile. Hereafter we refer country i's capital in its per-capita term $k_i \equiv \dfrac{K_i}{\overline{L}_i}$. The production in country i is defined in its per-capita form by the function $f_i(k_i)$, with $f_i(0) = 0$ and $f_i'(k_i) > 0 > f_i''(k_i)$. To make our analysis more explicit, we use later the linear model with the quadratic production function $f_i(k_i) = a_i k_i - k_i^2$ with $a_1 \geq a_2$.

Country i sets taxes on capital denoted by t_i. Under capital mobility, the arbitrage condition involves:

$$f_1'(k_1) - t_1 = f_2'(k_2) - t_2 = r, \tag{1}$$

where r is the price of capital.

Let s_i $(i = 1, 2)$ be the share of the population in country i. Namely, $s_1 + s_2 = 1$, where we assumed $s_1 \geq s_2$. The market clearing condition is:[5]

$$s_1 k_1 + s_2 k_2 = s_1 \overline{k}_1 + s_2 \overline{k}_2. \tag{2}$$

Differentiating (1) and (2) yields $\dfrac{\partial k_i}{\partial t_i} = \dfrac{s_j}{s_j f_i'' + s_i f_j''} < 0$, $\dfrac{\partial k_j}{\partial t_i} = -\dfrac{s_i}{s_j}\dfrac{\partial k_i}{\partial t_i} > 0$ and $\dfrac{\partial r}{\partial t_i} = f_j''\dfrac{\partial k_j}{\partial t_i} = -f_j''\dfrac{s_i}{s_j}\dfrac{\partial k_i}{\partial t_i} < 0$ $(i, j = 1, 2,\ j \neq i)$.

Residents within each country have heterogeneity with respect to the share of capital endowments, which is represented by θ, and a resident indexed by θ owns $\theta\overline{k}_i$ units of per-capita capital. The θ is distributed over the interval $(0, \overline{\theta})$ with a distribution function $\Phi_i(\cdot)$ such that

[5] $K_1 + K_2 = \overline{K}_1 + \overline{K}_2 \iff \dfrac{K_1}{\overline{L}_1}\overline{L}_1 + \dfrac{K_2}{\overline{L}_2}\overline{L}_2 = \dfrac{\overline{K}_1}{\overline{L}_1}\overline{L}_1 + \dfrac{\overline{K}_2}{\overline{L}_2}\overline{L}_2$. $\overline{L}_i = s_i\overline{L}$ $(i = 1, 2)$ for the total population $\overline{L}$, which derives (2).

$\int_0^{\overline{\theta}} \theta d\Phi_i(\theta) = 1$. We assume that each country has the right-skewed distribution of capital endowments, with the common median $\theta^m < 1$.

The local government i provides an equal amount of lump-sum transfer γ_i to each citizen, which is solely financed by taxation on capital. The government's balanced-budget constraint is given by

$$\gamma_i = t_i k_i.$$

A citizen in country i with the capital share θ receives (i) labor income $f_i(k_i) - f_i'(k_i)k_i$, (ii) rent from capital $r\theta\overline{k}_i$ and (iii) $\gamma_i = t_i k_i$. Namely,

$$\begin{aligned} u_i &= f_i(k_i) - f_i'(k_i)k_i + r\theta\overline{k}_i + t_i k_i \\ &= f_i(k_i) + r(\theta\overline{k}_i - k_i), \end{aligned} \tag{3}$$

where the second equality uses the arbitrage condition $f_i'(k_i) = r + t_i$.

Events in the model unfold as follows. In Stage 1, simultaneously in both countries a policy-maker (delegate) is elected under majority rule. In Stage 2, each delegate i simultaneously and independently chooses t_i. In Stage 3, having observed (t_1, t_2), private investors in both countries make their investment decisions, and productions take place.

Before we proceed, we first present an efficiency benchmark where the central planner maximizes $\sum_i f_i(k_i)s_i\overline{L}$ subject to (2). The first-order condition of the interior optimum with respect to k_i yields this first-best allocation of capital, denoted by $(k_1, k_2) = (k_1^*, k_2^*)$, implicitly defined as follows.

$$f_1'(k_1^*) = f_2'(k_2^*),\ \ s_1 k_1^* + s_2 k_2^* = s_1\overline{k}_1 + s_2\overline{k}_2. \tag{4}$$

The two important departures of our political-economic framework from the first-best solution are: (i) the presence of the capital-tax competition in (1); and (ii) the absence of individualized lump-sum transfers in (3). The possible difference in tax incentives that come from attracting foreign capital and income redistribution may result in $t_1 \neq t_2$ where (1) implies $f_1'(k_1) \neq f_2'(k_2)$.

3 Equilibrium

3.1 Stage 2: Policy-maker's Choice of Tax Rate

In this section, we solve our political-economy game backward. Note that the equilibrium conditions of Stage 3 (the capital-market equilibrium) are characterized by the arbitrage and the market clearing conditions in (1) and (2).

Let us represent a policy-maker in country i by θ_i. In Stage 2, given θ_i and θ_j, each delegate selects the tax policy (t_i for country i). The policy-maker with $\theta = \theta_i$ maximizes his/her utility u_i in (3) by choosing t_i, taking account of (1) and (2) in the subsequent stage. The first-order condition for country i's policy-maker is:

$$
\begin{aligned}
\frac{\partial u_i}{\partial t_i} &= (f_i'(k_i) - r)\frac{\partial k_i}{\partial t_i} + (\theta_i \bar{k}_i - k_i)\frac{\partial r}{\partial t_i} \\
&= t_i \frac{\partial k_i}{\partial t_i} + (\theta_i \bar{k}_i - k_i)\frac{\partial r}{\partial t_i} = 0. \qquad (5)
\end{aligned}
$$

Given (θ_i, θ_j), this expression defines implicitly the best response function of country i to the tax of country j: $t_i = \tau_i(t_j; \theta_i)$ $(i = 1, 2)$, which yields the Stage-2 tax rates $(t_1, t_2) = (t_1(\theta_1, \theta_2), t_2(\theta_1, \theta_2))$. The following properties are shown in Appendix 1:

Lemma 1 *Suppose that the production function exhibits the form of* $f_i'''(k_i) = 0$ *(linear model). Then (i)* $\dfrac{\partial \tau_i(t_j; \theta_i)}{\partial t_j} \in (0, 1)$. *(ii)* $\dfrac{\partial t_i(\theta_i, \theta_j)}{\partial \theta_i} < 0$*: country i's policy-maker with a higher capital ownership will choose lower tax rate* t_i*. (iii)* $\dfrac{\partial t_j(\theta_i, \theta_j)}{\partial \theta_i} < 0$*: the election of country i's policy-maker with a higher capital ownership will induce lower tax rate* t_j*.*

Part (i) is the conventional strategic complementarity where the reaction function is upward sloping, which is consistent with empirical studies (see, e.g., Brueckner (2003) for an overview). Part (ii) is intuitively clear. Part (iii) comes from the following formula derived in the Appendix 1:

$$
\frac{\partial t_j}{\partial \theta_i} = \frac{\partial t_i}{\partial \theta_i}\frac{\partial \tau_j}{\partial t_i}. \qquad (6)
$$

3.2 Stage 1: The Median Voter's Choice of A Policy Maker

The utility function (3) is linear in the type parameter θ_i which is distributed on the one-dimensional space. It thus belongs to the class of intermediate preferences, studied by Grandmont (1978) and Persson and Tabellini (2000). Then we can regard the median-voters as pivotal in selecting the type of a policy maker since his/her most preferred type is a Condorcet winner. Country i's median-voter's problem is given by

$$
\begin{aligned}
\max_{\theta_i} \quad & f_i(k_i) + r(\theta^m \bar{k}_i - k_i) \\
& \text{s.t. (1), (2), and } t_i = t_i(\theta_1, \theta_2) \ (i = 1, 2). \qquad (7)
\end{aligned}
$$

The delegate may be any citizen. A special case is when the decisive voter elects himself/herself, which is called *self-representation*, following Segendorff (1998). Let u_i^m be the utility of country i's median-voter. The first-order condition with respect to θ_i is given by

$$
\begin{aligned}
&\frac{\partial u_i^m}{\partial t_i}\frac{\partial t_i}{\partial \theta_i}+\frac{\partial u_i^m}{\partial t_j}\frac{\partial t_j}{\partial \theta_i}\\
=\;&\left[t_i\frac{\partial k_i}{\partial t_i}+\frac{\partial r}{\partial t_i}(\theta^m\overline{k}_i-k_i)\right]\frac{\partial t_i}{\partial \theta_i}+\left[t_i\frac{\partial k_i}{\partial t_j}+\frac{\partial r}{\partial t_j}(\theta^m\overline{k}_i-k_i)\right]\frac{\partial t_j}{\partial \theta_i}\\
=\;&(\theta^m-\theta_i)\overline{k}_i\left(1-\frac{\partial \tau_j}{\partial t_i}\right)\frac{\partial r}{\partial t_i}\frac{\partial t_i}{\partial \theta_i}-(\theta^m\overline{k}_i-k_i)\frac{\partial \tau_j}{\partial t_i}\frac{\partial t_i}{\partial \theta_i}=0,
\end{aligned} \tag{8}
$$

where we made use of (5) and (6).[6]

The first term and the second term in the second line of (8) show the direct effect and the strategic effect respectively. Under self-representation, the direct effect is proportional to the policy-maker's FOC in (5), which is zero. However, the strategic effect gives scope for the possibility of $\theta_i \neq \theta^m$, i.e., strategic delegation. In the context of capital-tax competition, since $\left(1-\frac{\partial \tau_j}{\partial t_i}\right)\frac{\partial r}{\partial t_i}\frac{\partial t_i}{\partial \theta_i}>0$ and $\frac{\partial \tau_j}{\partial t_i}\frac{\partial t_i}{\partial \theta_i}<0$, we have:

$$
\theta_i \lesseqgtr \theta^m \iff \theta^m\overline{k}_i-k_i \lesseqgtr 0. \tag{9}
$$

To interpret (9), the following decomposition is useful:

$$
\theta^m\overline{k}_i-k_i=(\theta^m-1)\overline{k}_i+(\overline{k}_i-k_i). \tag{10}
$$

The first term of the right-hand-side, $\theta^m\overline{k}_i-\overline{k}_i$, which is negative by $\theta^m<1$, represents the median-voter's tax incentives (see, e.g., Meltzer and Richard (1981, equation (13))).

The second term of the right-hand-side in (10) is negative for a capital-importing country ($\overline{k}_i<k_i$) which, other things being equal, benefits from taxing the capital. The capital-exporting country ($\overline{k}_i>k_i$) benefits from subsidizing the capital.[7] We show in the next section that the direction of capital importing/exporting in the equilibrium is determined by asymmetry of exogenous parameters.

Therefore, the capital-importer sends a delegate who, as a politician, wishes to tax higher than under self-representation. The capital-exporter has an offsetting incentive so that the direction of strategic delegation needs to be analyzed.

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[6] From (5), the first term of the second line of (8) becomes $(\theta^m-\theta_i)\overline{k}_i\frac{\partial r}{\partial t_i}\frac{\partial t_i}{\partial \theta_i}$. Since $\frac{\partial k_i}{\partial t_j}=-\frac{\partial k_i}{\partial t_i}$, the second term of the second line becomes $\left[\frac{\partial r}{\partial t_i}(\theta_i\overline{k}_i-k_i)+\frac{\partial r}{\partial t_j}(\theta^m\overline{k}_i-k_i)\right]\frac{\partial t_j}{\partial \theta_i}$. Moreover, $\frac{\partial r}{\partial t_i}+\frac{\partial r}{\partial t_j}=-1$. Using (6) and re-arranging yield the third line of (8).

[7] The capital importer (exporter) benefits from lower (higher) interest rate (see the second term of (3)). Other things being equal, $\partial r/\partial t_i<0$ derives the preference to the capital taxation. This is called the terms-of-trade effect.

Solving the system of (8) for $i = 1$, 2 yields the equilibrium choice of the delegate θ_i $(i = 1, 2)$ as a function of θ^m, denoted by θ_i^g. Substituting these to the Stage-2 tax rates and the Stage-3 capital allocations, we obtain $t_i(\theta_1^g, \theta_2^g)$ and $k_i(t_1(\theta_1^g, \theta_2^g), t_2(\theta_1^g, \theta_2^g)) \equiv k_i(\theta_1^g, \theta_2^g)$ $(i = 1, 2)$. From (1) and (3) we define $u_i^m(\theta_1^g, \theta_2^g) \equiv f_i(k_i(\theta_1^g, \theta_2^g)) + r(\theta_1^g, \theta_2^g) \cdot (\theta^m \overline{k}_i - k_i(\theta_1^g, \theta_2^g))$ as the equilibrium welfare of country i's median-voter. The comparison of these values with corresponding values under self-representation (where $\theta_i = \theta^m,\ i = 1, 2$) is our main interest.

3.3 Self-representation vs. Strategic Delegation: A Discussion

We now discuss several reasons why we compare the equilibrium utility $(u_i^m(\theta_1^g, \theta_2^g))$ with that of self-representation $(u_i^m(\theta^m, \theta^m) \equiv f_i(k_i(\theta^m, \theta^m)) + r(\theta^m, \theta^m) \cdot (\theta^m \overline{k}_i - k_i(\theta^m, \theta^m)))$.

The first reason is as follows. Let $u_i(\theta_1, \theta_2; \theta) \equiv f_i(k_i(\theta_1, \theta_2)) + r(\theta_1, \theta_2) \cdot (\theta \overline{k}_i - k_i(\theta_1, \theta_2))$. In Appendix 2 we show the following:

Lemma 2 *Suppose that $r(\theta^m, \theta^m) > r(\theta_1^g, \theta_2^g)$. Then (i) If $u_i^m(\theta_1^g, \theta_2^g) > u_i^m(\theta^m, \theta^m)$, then $u_i(\theta_1^g, \theta_2^g; \theta) > u_i(\theta^m, \theta^m; \theta)$ for all $\theta \leq \theta^m$. Moreover, (ii) if $u_i^m(\theta_1^g, \theta_2^g) < u_i^m(\theta^m, \theta^m)$, then $u_i(\theta_1^g, \theta_2^g; \theta) < u_i(\theta^m, \theta^m; \theta)$ for all $\theta \geq \theta^m$. Namely, if country i's median-voter is made better-off (worse-off) under strategic delegation than under self-representation, so is any citizen poorer (richer) than the median-voter.*

The premise of the lemma, $r(\theta^m, \theta^m) > r(\theta_1^g, \theta_2^g)$, holds in all the models in Section 4. Therefore, the median-voter's welfare is a useful reference for the overall welfare implication of strategic delegtion.

The second reason to analyze the self-representation outcome is to highlight the role of campaign promises, which was not much emphasized in the literature. If the policy-makers in each country are committed to the most preferred tax rate, then the structure of the game is basically one-shot decision-making over the preferred taxes in each country. The outcome corresponds to the self-representation (the Nash tax-competition outcome by the median-voters). On the other hand, the current multi-stage model corresponds to the case when the campaign promise by any citizen-candidate is not binding. A detailed discussion is given in Section 5 in interpreting our results.

4 Directions of Strategic Delegation and Voter Welfare

4.1 Symmetric Countries ($a_1 = a_2 = a,\ s_1 = s_2 = 0.5,\ \overline{k}_1 = \overline{k}_2 = \overline{k}$)

As a benchmark, we start with the case of symmetric countries ($a_1 = a_2 = a,\ s_1 = s_2 = 0.5,\ \overline{k}_1 = \overline{k}_2 = \overline{k}$). The equilibrium delegate in an economy is symmetric ($\theta_1^g = \theta_2^g$; see, e.g., (13) below) so that $k_1(\theta_1^g, \theta_2^g) = k_2(\theta_1^g, \theta_2^g) = \overline{k}$. Substituting $k_i = \overline{k}_i$ into (9), the conventional situation of $\theta^m < 1$ (i.e., skewed income distribution) will generate a consequence of

$$\theta_i^g < \theta^m \ (i = 1, 2).$$

From Lemma 1 (ii), (iii), we have

$$t_i(\theta_1^g, \theta_2^g) > t_i(\theta^m, \theta^m), \ (i = 1, 2). \tag{11}$$

We now compare the utilities of median-voters with strategic delegation ($u_i^m(\theta_1^g, \theta_2^g)$) and under self-representation ($u_i^m(\theta^m, \theta^m)$). Since $t_1(\theta^m, \theta^m) = t_2(\theta^m, \theta^m)$ (see (14) below), we have $k_1(\theta^m, \theta^m) = k_2(\theta^m, \theta^m) = \overline{k}$. From (3), (11) and (1) where $r = f'(\overline{k}) - t_i$, the difference would eventually be:

$$u_i^m(\theta_1^g, \theta_2^g) - u_i^m(\theta^m, \theta^m) = -\{t_i(\theta_1^g, \theta_2^g) - t_i(\theta^m, \theta^m)\}(\theta^m \overline{k} - \overline{k}) > 0 \ (i = 1, 2). \tag{12}$$

That is, in both countries, the median-voters are made better off by strategic delegation. Also, as shown in Lemma 2 (note that $r(\theta^m, \theta^m) - r(\theta_1^g, \theta_2^g) > 0$ here), the citizens who have lower income than the median-voter are better off under strategic delegation.

As discussion in Persson and Tabellini (1992) and Ihori and Yang (2009),[8] the political effect ($\theta^m < 1$) and the strategic delegation ($\theta_i^g < \theta^m$) mitigate the conventional tax-competition effect towards the lower tax rates. This result is driven purely by the income-redistribution motive. The departure from the symmetric countries illuminates rich implications for international capital allocations, the tax gap and citizens' welfare.

4.2 Countries with Asymmetric Productivities ($a_1 > a_2, \ s_1 = s_2 = 0.5, \ \overline{k}_1 = \overline{k}_2 = \overline{k}$)

In this subsection we consider the case of $a_1 > a_2$ where country 1 has higher capital productivities. It turns out that country 1's median-voter takes advantage of the national rent of higher productivity and aggravates so-called tax-the-foreigner effect.

In order to see the difference in the tax incentives and its effect on strategic delegation, we overview the structure of the equilibrium backwards. In Stage 3, the difference in national productivities ($a_1 > a_2$) has direct effects in which country 1 tends to have higher capital employment. Given $\overline{k}_1 = \overline{k}_2$ and $s_1 = s_2$, country 1 becomes the capital importer and country 2 becomes the capital exporter. These effects in turn cause the *tax-the-foreigner effect* demonstrated in the second term of (10), which causes $t_1 > t_2$ in the second stage.

It is convenient to define the term $\delta \equiv \dfrac{a_1 - a_2}{\overline{k}} > 0$. In Appendix 3, we show that the equilibrium delegation is given by[9]

$$\theta_1^g = -1 + 2\theta^m - \frac{\delta}{12} < \theta^m, \ \theta_2^g = -1 + 2\theta^m + \frac{\delta}{12}. \tag{13}$$

[8] Note that, unlike Ihori and Yang (2009, Proposition 1), we do not have their issue of possible undersupply of the public-good since $t_i k_i$ is a lump-sum transfer which only causes redistribution. Also, the structure of our model is richer than Persson and Tabellini (1992) so that we will examine various dimensions of the political tensions and economic effects in the following subsections.

[9] Formally, (13) is written as, for example, when $\delta = 0$, $\theta_i^g = \max\{-1 + 2\theta^m, 0\}$. To highlight the main features of the model, we suppress a full analysis taking account of corner solutions, assuming that the parameters are in a relevant range to satisfy the interior solution.

In addition to the effect mentioned in Section 4.1 ($\theta_i^g = -1 + 2\theta^m < \theta^m$ when $\delta = 0$), a country with high (low) productivity tends to send a low (high) capital owner. We therefore have $\theta_1^g < \theta^m$ for country 1. As to the relationship between θ_2^g and θ^m, there are offsetting effects between intranational political competition (that directs for higher taxes) and the incentive as a capital exporter (that directs for lower taxes).

Proposition 1 *Suppose that* $a_1 > a_2,\ s_1 = s_2 = 0.5,\ \overline{k}_1 = \overline{k}_2 = \overline{k}$.

(i) $\theta_1^g < \theta^m$ *for all parameter values, and* $\theta_2^g \lesseqgtr \theta^m \iff \delta \lesseqgtr 12(1-\theta^m) \equiv \delta^0$.[10]

(ii) $k_1(\theta_1^g, \theta_2^g) < k_1(\theta_1^m, \theta_2^m) < k_1^*$, $k_2(\theta_1^g, \theta_2^g) > k_2(\theta_1^m, \theta_2^m) > k_2^*$, *and* $k_1(\theta_1^g, \theta_2^g) > k_2(\theta_1^g, \theta_2^g)$.

The reason for part (ii) is as follows. In Appendix 3 we show:

$$t_1(\theta_1, \theta_2) - t_2(\theta_1, \theta_2) = \frac{\delta \overline{k}}{2} - (\theta_1 - \theta_2)\overline{k}. \tag{14}$$

The first term of the right-hand side captures the difference in country's tax incentives due to the tax-the-foreigner effect, which is present even under self-representation ($\theta_i = \theta^m$). We therefore have $t_1(\theta^m, \theta^m) > t_2(\theta^m, \theta^m)$ (the more productive country levies the higher tax rates). Under strategic delegation, the second term strengthens the difference ($\theta_1^g < \theta_2^g$ from (13)), so that the tax gap is widened under strategic delegation ($t_1(\theta_1^g, \theta_2^g) - t_2(\theta_1^g, \theta_2^g) > t_1(\theta^m, \theta^m) - t_2(\theta^m, \theta^m)$), which induces the capital flow from country 1 to country 2. This contrasts with the conclusion of Section 4.1 where the tax-competition effect is mitigated through the strategic delegation. There, the increase of the median-voter's welfare is solely by income redistribution, whereas here the allocation of capital matters. The allocation of k_i is inefficient under tax competition, and the inefficiency (divergence from the first-best allocation) is worsened by strategic delegation.

Proposition 2 *Suppose that* $a_1 > a_2,\ s_1 = s_2 = 0.5,\ \overline{k}_1 = \overline{k}_2 = \overline{k}$. *There exist* $\delta^1 > \delta^0 \equiv 12(1-\theta^m)$ *and* $\delta^2 \in (0, \delta^0)$, $\dfrac{\delta^2}{\delta^0} \approx 0.82085$ *and* $\dfrac{\delta^1}{\delta^0} \approx 1.3923$ *such that:*

(i) For $\delta \in (0, \delta^2)$, $u_1^m(\theta_1^g, \theta_2^g) > u_1^m(\theta^m, \theta^m)$ *and* $u_2^m(\theta_1^g, \theta_2^g) > u_2^m(\theta^m, \theta^m)$*: both median-voters are made better-off under strategic delegation than under self-representation.*

(ii) For $\delta \in (\delta^2, \delta^1)$, $u_1^m(\theta_1^g, \theta_2^g) > u_1^m(\theta^m, \theta^m)$ *and* $u_2^m(\theta_1^g, \theta_2^g) < u_2^m(\theta^m, \theta^m)$*: the median-voter of country 1 (high-productivity country) is made better-off under strategic delegation than under self-representation, whereas the opposite happens for country 2's median-voter.*

(iii) For $\delta > \delta^1$, $u_1^m(\theta_1^g, \theta_2^g) < u_1^m(\theta^m, \theta^m)$ *and* $u_2^m(\theta_1^g, \theta_2^g) < u_2^m(\theta^m, \theta^m)$*: both median-voters are worse-off under strategic delegation than under self-representation.*

When the difference in productivities is sufficiently low, the effect in (12) (i.e., greater redistributive taxes through strategic delegation) is a dominant force for median-voters' utilities under strategic delegation. However, for sufficiently high productivity differences, the benefit of strategic delegation diminishes for both countries, as the divergence of the preferred tax rates represented by

[10] Proposition 1 is originally shown in Nishimura and Terai (2013) in an augumented model with a public-input.

(13) and (14) increases. The low-productivity country has lower threshold value towards preferring self-representation. We can also interpret the proposition with keeping δ and varying $1-\theta^m$. As δ^2 and δ^1 are decreasing in θ^m, lower θ^m (greater skewness of the income distribution) would make case (i) of Proposition 2 more likely to happen.[11]

The above observations are similar to a recent contribution by Hindriks and Nishimura (2016) who analyzed the benefit of tax leadership (Stackelberg tax competition). They considered a framework where the citizens have uniform capital ownership[12] (corresponding to our θ^m) and show that: (i) there exists a threshold level of θ^m below which both countries prefer the Stackelberg outcomes to the conventional Nash tax-competition outcome, and vice versa for sufficiently high θ^m; and (ii) the threshold levels are decreasing with respect to production asymmetry (δ). In essence, the citizens' preference towards the Stackelberg leadership resembles that of the strategic delegation, in the sense that the median-voter here takes account of the direct effect (the first term of (8)) and the indirect effect (the second term of (8)). On the other hand, self-representation does not have the indirect effect. See Section 5 for further discussions.

4.3 Countries with Different Populations ($s_1 > s_2,\ a_1 = a_2 = a,\ \overline{k}_1 = \overline{k}_2 = \overline{k}$)

We now consider a framework by Bucovetsky (1991) and Wilson (1991) in which the population is different across countries ($s_1 > s_2$). Following the conventional framework, we can show that $t_1(\theta^m, \theta^m) > t_2(\theta^m, \theta^m)$ under self-representation. When there is no asymmetry in other dimensions ($a_1 = a_2 = a$, $\overline{k}_1 = \overline{k}_2 = \overline{k}$) the low-population country (country 2) obtains higher per-capita capital ($k_2(\theta^m, \theta^m) > k_1(\theta^m, \theta^m)$). This causes so-called *benefit of smallness* in which $u_1(\theta^m, \theta^m; \theta) < u_2(\theta^m, \theta^m; \theta)$ for all θ, as well as inefficiency of the capital allocation ($k_2(\theta^m, \theta^m) > k_2^* = k_1^* > k_1(\theta^m, \theta^m)$). In the following, we investigate the implications of strategic delegation in this model.

In this case, we obtain the following (θ_1^g, θ_2^g):

$$\theta_i^g = \frac{-(1-s_i^2) + \theta_i^m(1+2s_i^2)}{3s_i^2}. \tag{15}$$

One can verify $\theta_1^g > \theta_2^g$ for $s_1 > 0.5 > s_2$. Namely, the high-population country sends a policy-maker that is more right, in order to counteract the disadvantage from the capital-tax competition.

Proposition 3 *Suppose that $s_1 > s_2,\ a_1 = a_2 = a,\ \overline{k}_1 = \overline{k}_2 = \overline{k}$.*
(i) $\theta_1^g > \theta_2^g$ and $\theta_1^g < \theta^m$ for all parameter values.
(ii) $k_1(\theta_1^m, \theta_2^m) < k_1(\theta_1^g, \theta_2^g) < k_1^* = \overline{k}$, $k_2(\theta_1^m, \theta_2^m) > k_2(\theta_1^g, \theta_2^g) > k_2^* = \overline{k}$.

As to the direction of strategic delegation, $\theta_2^g < \theta^m$ for country 2, as a capital-importer. The capital-exporter has offsetting effects between redistribution and capital-exporting as shown in (10), but

[11] From (A.9) in Appendix 3, $\delta \le 4$ is necessary to obtain an interior solution. Therefore, when θ^m is sufficiently low, the cases of $\theta_2^g > \theta^m$ in Proposition 1 (ii) and $\delta > \delta^i$ ($i = 1, 2$) in Proposition 2 (ii) and (iii) may not appear.

[12] In their model, a part of capitals is owned by the residents of the third country.

in the linear model we obtain $\theta_1^g < \theta^m$ unambiguously. As to the allocation of capital, unlike Proposition 1 (ii), the tax gap is reduced under strategic delegation[13] $(0 < t_1(\theta_1^g, \theta_2^g) - t_2(\theta_1^g, \theta_2^g) < t_1(\theta^m, \theta^m) - t_2(\theta^m, \theta^m))$, which mitigates the capital flight to the low-population country and efficiency loss under self-representation.

When countries differ in population size, the low-population country (country 2) has higher capital demand elasticity (sensitivity of the tax base to fiscal rates): from (1) and (2), $-\dfrac{\partial k_1}{\partial t_1} = -\dfrac{s_2}{s_1}\dfrac{\partial k_2}{\partial t_2} < -\dfrac{\partial k_2}{\partial t_2}$. This effect tends to make country 2's tax rate lower than that of country 1. However, the terms-of-trade effect works in the opposite direction, where higher tax rates benefit the capital importer and harm the capital exporter through the lower interest rate. In the conventional models (Bucovetsky (1991, 2009), Wilson (1991)), the terms-of-trade effect is not more important than the tax-base-elasticity effect. Here, on the other hand, the strategic delegation works to increase the capital importer's tax rate to the greater extent than the capital exporter. This observation is in contrast with the case of Section 4.2 where $a_1 > a_2$, in which a country with lower tax-base elasticity[14] is a capital *importer*, so the tax gap increases by strategic delegation.

Proposition 4 *Suppose that* $s_1 > s_2,\ a_1 = a_2 = a,\ \overline{k}_1 = \overline{k}_2 = \overline{k}$.

(i) For all $s_1 \in (0.5, 1)$, $u_1^m(\theta_1^g, \theta_2^g) > u_1^m(\theta^m, \theta^m)$ *and* $u_2^m(\theta_1^g, \theta_2^g) > u_2^m(\theta^m, \theta^m)$*: both median-voters are made better-off under strategic delegation than under self-representation.*

(ii) $u_1(\theta_1^g, \theta_2^g; \theta) < u_2(\theta_1^g, \theta_2^g; \theta)$ *for all* θ*: the benefit of smallness is preserved under strategic delegation.*

Under population asymmetry, contrary to Proposition 2, the benefit of strategic delegation for median-voters is preserved for all parameter values. The reason is that the allocation of capital becomes closer to the first-best, compared with the self-representation level. The extent of the population who benefits from strategic delegation is in fact large in this case. From the derivation of Appendix 6, one can show that, for the citizens who hold *average* level of capital ($\theta_i \overline{k}_i = \overline{k}_i$), (i) $u_2(\theta_1^g, \theta_2^g; 1) > u_2(\theta^m, \theta^m; 1)$ for all $s_1 \in (0.5, 1)$; and (ii) $u_1(\theta_1^g, \theta_2^g; 1) > u_1(\theta^m, \theta^m; 1)$ for sufficiently high s_1. With the same logic as above, in respective cases, $u_i(\theta_1^g, \theta_2^g; \theta) > u_i(\theta^m, \theta^m; \theta)$ holds for all $\theta \leq 1$. These features are surprising, given that, for other dimentions of asymmetry in Sections 4.2 and 4.4, $u_i(\theta_1^g, \theta_2^g; 1) < u_i(\theta^m, \theta^m; 1)$ always holds at least for the capital-exporting country.[15]

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[13] From (A.10) in Appendix 5 we have $t_1(\theta_1^g, \theta_2^g) - t_2(\theta_1^g, \theta_2^g) = \dfrac{2}{3}\dfrac{\overline{k}(1-\theta^m)(2s_1-1)}{s_1 s_2} = \dfrac{2}{3}\left(t_1(\theta^m, \theta^m) - t_2(\theta^m, \theta^m)\right) > 0$.

[14] For the case of $a_1 > a_2$, evaluated at equal tax rates, the capital demand elasticities at $t_1 = t_2 = t$ are $|\varepsilon_{k_i/t_i}| = -\dfrac{\partial k_i}{\partial t_i}\dfrac{t_i}{k_i} = \dfrac{t}{a_i - a_j + 4\overline{k}}$. Therefore, country 1 has lower capital demand elasticity than country 2.

[15] In Section 4.2, $u_2(\theta_1^g, \theta_2^g; 1) - u_2(\theta^m, \theta^m; 1) = -\dfrac{(7\delta^2 + 48\delta(1-\theta^m))\overline{k}^2}{576} < 0$ for all $\delta > 0$, and Proposition 2 (ii) and Lemma 2 suggest that $u_1(\theta_1^g, \theta_2^g; 1) < u_1(\theta^m, \theta^m; 1)$ for sufficiently high δ. Similarly in the model of Section 4.4 below, for the capital exporter (country 1), $u_1(\theta_1^g, \theta_2^g; 1) - u_1(\theta^m, \theta^m; 1) < 0$ whenever $\overline{k}_1 > \overline{k}_2$.

4.4 Countries with Asymmetric Capital Endowments ($a_1 = a_2 = a,\ s_1 = s_2 = 0.5,\ \overline{k}_1 > \overline{k}_2$)

Suppose now that country 1 has a higher capital endowment. In this case, country 1 becomes capital-exporter who tends to lower the tax rate. However, country 1 also has a bigger tax base, which can receive higher tax revenue from the same tax rates.

Let $\xi > 0$ be the value such that $\overline{k}_1 = \overline{k}_2(1+\xi)$. The equilibrium delegation is given by

$$\theta_1^g = -1 + 2\theta^m + \frac{\xi}{1+\xi}\left(\frac{1}{2} - \frac{1}{3}\theta^m\right),\ \theta_2^g = -1 + 2\theta^m - \xi\left(\frac{1}{2} - \frac{1}{3}\theta^m\right) < \theta^m. \tag{16}$$

Parallel to the previous propositions, we obtain the following:

Proposition 5 *Suppose that* $a_1 = a_2 = a,\ s_1 = s_2 = 0.5,\ \overline{k}_1 > \overline{k}_2$.

(i) $\theta_2^g < \theta^m$ *and* $\theta_2^g < \theta_1^g$ *for all parameter values. When* $\theta^m \in \left(\frac{3}{4}, 1\right)$, *then* $\theta_1^g \lesseqgtr \theta^m \iff \xi \lesseqgtr \frac{6(1-\theta^m)}{4\theta^m - 3} \equiv \xi^0(\theta^m)$. *When* $\theta^m \leq \frac{3}{4}$, *then* $\theta_1^g < \theta^m$.

(ii) $k_1(\theta_1^g, \theta_2^g) > k_1(\theta_1^m, \theta_2^m) > k_1^*,\ k_2(\theta_1^g, \theta_2^g) < k_2(\theta_1^m, \theta_2^m) < k_2^* = k_1^*$.

Proposition 6 *Suppose that* $a_1 = a_2 = a,\ s_1 = s_2 = 0.5,\ \overline{k}_1 > \overline{k}_2$. *There exists* $\theta^1 \approx 0.71120$ *and* $\theta^2 \approx 0.80683$ *such that:*

(i) For $\theta^m \in (\theta^1, 1)$, *thete exists* $\xi^1(\theta^m)$ *such that* $u_1^m(\theta_1^g, \theta_2^g) \gtreqless u_1^m(\theta^m, \theta^m) \iff \xi \lesseqgtr \xi^1(\theta^m)$. $\xi^1(\theta^m)$ *is decreasing in* θ^m, *with* $\xi^1(\theta^m) > 0$ *for all* $\theta^m \in (\theta^1, 1)$ *and* $\xi^1(\theta^m) < \xi^0(\theta^m)$ *for all* $\theta^m \in \left(\frac{3}{4}, 1\right)$. *For* $\theta^m \leq \theta^1$, $u_1^m(\theta_1^g, \theta_2^g) > u_1^m(\theta^m, \theta^m)$ *for all* $\xi > 0$.

(ii) For $\theta^m \in (\theta^2, 1)$, *thete exists* $\xi^2(\theta^m)$ *such that* $u_2^m(\theta_1^g, \theta_2^g) \gtreqless u_2^m(\theta^m, \theta^m) \iff \xi \lesseqgtr \xi^2(\theta^m)$. $\xi^2(\theta^m)$ *is decreasing in* θ^m *with* $\xi^2(\theta^m) > \xi^0(\theta^m)$ *for all* $\theta^m \in (\theta^2, 1)$. *For* $\theta^m \leq \theta^2$, $u_2^m(\theta_1^g, \theta_2^g) > u_2^m(\theta^m, \theta^m)$ *for all* $\xi > 0$.

Proposition 5 (i) shares the basic features with Proposition 1, in that only the capital-exporter may delegate to a richer citizen than a median-voter. However, in this case there explicitly arises a value of θ^m below which the direction of strategic delegation is unambiguously left to the median-voter for both countries. As to the tax gap, $t_2(\theta_1^g, \theta_2^g) - t_1(\theta_1^g, \theta_2^g) > t_2(\theta^m, \theta^m) - t_1(\theta^m, \theta^m) > 0$,[16] which brings Proposition 5 (ii). Also in Proposition 6, there explicitly arises a value of θ^m below which the strategic delegation is unambiguously beneficial to the median-voters.

5 The Role of Campaign Promises

In this section we discuss the role of campaign promises in interpreting our results.

[16] From (A.12) in Appendix 7 we have $t_2(\theta_1^g, \theta_2^g) - t_1(\theta_1^g, \theta_2^g) = \frac{4}{3}\xi\theta^m\overline{k}_2 = \frac{4}{3}\left(t_2(\theta^m, \theta^m) - t_1(\theta^m, \theta^m)\right) > 0$.

Suppose that the policy-makers in each country are committed to the most preferred tax rate in Stage 1. Then the election of a policy maker is equivalent to the choice of his/her most preferred tax rate. Given t_j $(j \neq i)$ which is also credible at Stage 1, the citizen-candidate announces the most preferred tax rate along the tax reaction function. As in conventional models, the median-voter is pivotal in the voting. The equilibrium tax choices are given by the Nash equilibrium of (5) with $\theta_i = \theta^m = \theta_j$, which is the self-representation outcome.

If, on the other hand, the campaign promise by any citizen-candidate is not binding, country i's median-voter's problem is given by (7). The reason is as follows. In Stage 1, the voters take the foreign election outcome $(\theta_j,\ j \neq i)$ as given in (7). In Stage 2, the elected policy-makers solve (5) and choose $t_i = t_i(\theta_1, \theta_2)$ $(i = 1, 2)$. These policy outcome *functions* are acknowledged as constraints in (7), but the *outcomes* t_i and t_j are not given in Stage 1. Although the median-voter is pivotal in selecting θ_i, he/she may not choose θ^m (and, accordingly, he/she may not choose $(t_1, t_2) = (t_1(\theta^m, \theta^m), t_2(\theta^m, \theta^m)))$, in the equilibrium. We therefore conclude the following:

Lemma 3 *(a) If citizen-candidates are committed to their proposal of tax rates at Stage 1, the equilibrium tax rates are* $(t_1(\theta^m, \theta^m), t_2(\theta^m, \theta^m))$*, i.e, those of self-representation. Accordingly, the equilibrium utility of the median-voters in country i corresponds to* $u_i^m(\theta^m, \theta^m)$*. (b) If citizen-candidates do not commit to their proposal of tax rates at Stage 1, the equilibrium tax rates are* $(t_1(\theta_1^g, \theta_2^g), t_2(\theta_1^g, \theta_2^g))$*, i.e, those of strategic delegation. Accordingly, the equilibrium utility of the median-voters in country i corresponds to* $u_i^m(\theta_1^g, \theta_2^g)$*.*

An interesting hybrid case is when the representative in one country *commits* to t_i in Stage 1 and the other representative does *not* commit to t_j. The equilibrium outcome of this case is identical to that of the *Stackelberg tax competition*.[17]

Persson and Tabellini (1992) examined the case of the symmetric countries. Assuming that the voters do not take the foreign policy as given in Stage 1, they found that the median-voters become better-off by strategic delegation (our (12)). They concluded that strategic delegation is self-enforcing (Persson and Tabellini (1992, p. 698)). In the subsequent literature of the international decision-making, strategic delegation in the domestic politics (representative democracy) is taken for granted.[18] Lemma 3 implies that there is *lack of* commitment in Stage 1. However, our Propositions

[17] Suppose that the representative in one country (say, country 1) commits to t_1 in Stage 1 and the other representative (country 2) does not commit to t_2. Since country 2 cannot influence the choice of t_1 through strategic delegation, country 2's choice is determined by (5) with $\theta_i = \theta^m$. Then country 1 can decide on t_1 along $\tau_2(t_1; \theta^m)$. The choice of t_1 is characterized by $\dfrac{\partial u_1^m}{\partial t_1} + \dfrac{\partial u_1^m}{\partial t_2}\dfrac{\partial \tau_2}{\partial t_1} = 0$ (which is, through (6), equivalent to (8) with $\theta_2 = \theta^m$). Therefore, the equilibrium is identical to the Stackelberg tax competition outcome where country 1 is the Stackelberg-tax leader and country 2 is the Stackelberg-tax follower.

[18] On the other hand, the self-representation outcome is typically perceived as the result of *direct democracy*. Ogawa and Susa (2014), for example, considered nations' choice between the direct democracy (self-representation) and the representative democracy which carries strategic delegation. They show that shifting from direct democracy to representative democracy is the dominant strategy of the median-voters in each country, irrespective of the productivity differences. Thus their focus is put on the shift of the political regime, not on the credibility of electoral promises.

2 and 6 show that, when asymmetry (the productivity gap or the differences in capital endowments) is sufficiently large, contrary to the suggestion by Persson and Tabellini (1992), the median-voter and the majority of the citizens of both countries can be worse-off by the lack of commitment to a campaign promise on the policies. Even though each country aims to gain through a choice of $\theta_i^g \neq \theta^m$ in (8), the median-voter of one (or both) country can eventually become worse-off than $u_i(\theta^m, \theta^m)$. Thus, strategic delegation can constitute a Prisoners' Dilemma. As in Hindriks and Nishimura (2016) which we quoted after Proposition 2, further tax changes along country j's tax reaction function (the indirect effect in (8)) may cause negative externalities to country j under sufficient asymmetry, when the direction of preferred tax rates diverges.[19]

In reality, the elected politicians often fulfill their campaign promises, even if they can seek strategic advantages by not making the promises.[20] Our results justify such real-world cases. In some cases, the commitment to the campaign promise is not only plausible but also desirable.

6 Conclusion

This paper examined a political process and economic consequences of tax competition among asymmetric countries. Various types of asymmetries across countries are examined. When the countries have different productivity of the capital, strategic delegation increases the divergence of tax rates across countries. As a result, strategic delegation may make the majority of citizens worse-off than the self-representation outcome. These findings differ from the previous results based on symmetric countries. Notably, strategic complementarity in the tax-reaction functions is not sufficient to make the median-voters better-off than the self-representation outcome. The patterns are different in a model with different population. A high-population country elects a representative more right than the low-population country. This effect not only reduces the capital flight to the low-population country, but also increases the median-voter's utility. Since it also reduces the inefficiency of capital allocation associated with the tax competition, strategic delegation is beneficial to the low-population country, too. When the countries differ in capital endowments, there

[19] In the tax-leadership game (see footnote 17), as a result of the tax leader's choice, the tax follower may become worse-off than the outcome of the Nash-tax competition. Similarly, in the strategic delegation game, each country tries to take advantage of the indirect effect, which may not be beneficial to the other country.

[20] For example, in the U.K., 2010 Manifesto of the Conservative Party mentioned the reduction in the corporate tax rate. After the 2010 election, the Cameron ministry executed the tax cut as specified in the Manifesto, with the U.K.'s tax rate over the OECD average eventually falling below it. Also, in the 2012 presidential election in the U.S., the Democrat candidate Obama pledged to reduce the corporate tax rate from 35% to 28%. This promise is partly to compete with the Conservative candidate Romney who promised the reduction to 25%. After the election, President Obama proposed a reduction in the corporate tax rate as he swore, in the Budget Proposal of the United States Government. Needless to say, the structure of the corporate income tax is not characterized by the tax rate alone. In the U.K.'s case, policies including the enforcement of Controlled Foreign Companies (CFC) rules are crucial to proceed the territorial system. In the U.S., on the other hand, compatibility between the worldwide system and tax enforcement towards multinational corporates is a crucial issue. The candidates have clearly stated policy proposals for these issues, which are executed after the respective elections.

explicitly arises the degree of income inequality (skewness) above which the strategic delegation is unambiguously beneficial to the median-voters.

We also highlighted the role of campaign promises. In the global economy, one country's choice of a tax rate generates fiscal externalities. Therefore, political candidates' commitment to the tax rate during the election is crucial for the determinants of the equilibrium outcome and citizens' welfare. The electoral competition model traditionally assumed that electoral promises are binding, following Downs (1957), but Alesina (1988) examined the case where policy-motivated politicians, once they are elected, would not care their initial promise. These polar cases correspond to self-representation and strategic delegation of the current study, respectively. We showed in Section 5 that a hybrid case in a multinational setting yields a Stackelberg tax-competition outcome. Given public concerns about politicians' honesty as well as the criticism by the media, campaign promises are not wholly irrelevant in reality. Whereas recent studies on the electoral competition model endogenized the commitment decision incorporating the cost of betrayal,[21] extension of these studies to the multinational setting would be an intriguing subject for further studies.

Appendix

Appendix 1: Proof of Lemma 1

Since $\dfrac{\partial r}{\partial t_i} = -f_j'' \dfrac{s_i}{s_j}\dfrac{\partial k_i}{\partial t_i}$, (5) is rearranged to

$$\frac{\partial u_i}{\partial t_i} = \left(t_i - (\theta_i \overline{k}_i - k_i) f_j'' \frac{s_i}{s_j}\right)\frac{\partial k_i}{\partial t_i} \equiv \beta_i(t_i, t_j)\frac{\partial k_i}{\partial t_i} = 0, \tag{A.1}$$

where $\beta_i \equiv t_i - (\theta_i \overline{k}_i - k_i) f_j'' \frac{s_i}{s_j}$.

Note that $\dfrac{\partial k_i}{\partial t_i} < 0$. Total differenciation of the first-order condition yields

$$\begin{aligned} \frac{\partial \tau_i(t_j;\theta_i)}{\partial t_j} = -\frac{\partial \beta_i/\partial t_j}{\partial \beta_i/\partial t_i} &= -\frac{\frac{s_i}{s_j}\left[f_j''\frac{\partial k_i}{\partial t_j} - (\theta_i\overline{k}_i - k_i) f_j'''\frac{\partial k_j}{\partial t_j}\right]}{1 + \frac{s_i}{s_j}\left[f_j''\frac{\partial k_i}{\partial t_i} - (\theta_i\overline{k}_i - k_i) f_j'''\frac{\partial k_j}{\partial t_i}\right]} \\ &= \frac{\frac{s_i}{s_j}\left[f_j'' + \frac{s_i}{s_j}(\theta_i\overline{k}_i - k_i) f_j'''\right]\frac{\partial k_i}{\partial t_i}}{1 + \frac{s_i}{s_j}\left[f_j'' + \frac{s_i}{s_j}(\theta_i\overline{k}_i - k_i) f_j'''\right]\frac{\partial k_i}{\partial t_i}}, \end{aligned} \tag{A.2}$$

wehere we used $\dfrac{\partial k_i}{\partial t_i} = \dfrac{s_j}{s_j f_i'' + s_i f_j''} = \dfrac{s_j}{s_i}\dfrac{\partial k_j}{\partial t_j} < 0$, $\dfrac{\partial k_j}{\partial t_i} = -\dfrac{s_i}{s_j}\dfrac{\partial k_i}{\partial t_i}$ and $\dfrac{\partial k_i}{\partial t_j} = -\dfrac{\partial k_i}{\partial t_i}$.

[21] See, e.g., Austen-Smith and Banks (1989), Terai (2009), and Asako (2015).

Since $\dfrac{\partial k_i}{\partial t_i} < 0$, when $f_j''' = 0$ (linear model), we have $0 < \dfrac{\partial \tau_i(t_j;\theta_i)}{\partial t_j} < 1$. That is, tax rates are strategic complements in both countries with the slopes less than unity. This proves part (i) of Lemma 1.

Totally differentiating the system of $\beta_i(t_i,t_j) = 0$ and $\beta_j \equiv t_j - (\theta_j \overline{k}_j - k_j) f_i'' \frac{s_j}{s_i} = 0$, we have

$$\begin{pmatrix} \partial\beta_i/\partial t_i & \partial\beta_i/\partial t_j \\ \partial\beta_j/\partial t_i & \partial\beta_j/\partial t_j \end{pmatrix} \begin{pmatrix} dt_i \\ dt_j \end{pmatrix} = \begin{pmatrix} \overline{k}_i f_j'' \frac{s_i}{s_j} d\theta_i \\ \overline{k}_j f_i'' \frac{s_j}{s_i} d\theta_j \end{pmatrix}.$$

We therefore have

$$\begin{pmatrix} \partial t_i/\partial\theta_i \\ \partial t_j/\partial\theta_i \end{pmatrix} = \frac{\overline{k}_i f_j'' \frac{s_i}{s_j}}{\Delta} \begin{pmatrix} \partial\beta_j/\partial t_j \\ -\partial\beta_j/\partial t_i \end{pmatrix} = \frac{\overline{k}_i f_j'' \frac{s_i}{s_j}}{\Delta} \frac{\partial\beta_j}{\partial t_j} \begin{pmatrix} 1 \\ \partial\tau_j/\partial t_i \end{pmatrix}, \tag{A.3}$$

where $\Delta \equiv \dfrac{\partial\beta_i}{\partial t_i}\dfrac{\partial\beta_j}{\partial t_j} - \dfrac{\partial\beta_i}{\partial t_j}\dfrac{\partial\beta_j}{\partial t_i}$.

The last equation of (A.3) follows from the formula of the reaction function (A.2) applied to country j. Note that $\dfrac{\partial\beta_j}{\partial t_j} > 0$ from the second-order condition, and also, $\Delta = \dfrac{\partial\beta_i}{\partial t_i}\dfrac{\partial\beta_j}{\partial t_j}\left(1 - \dfrac{\partial\tau_i}{\partial t_j}\dfrac{\partial\tau_j}{\partial t_i}\right) > 0$. We therefore have $\dfrac{\partial t_i}{\partial\theta_i} < 0$ (part (ii)) and $\dfrac{\partial t_j}{\partial\theta_i} = \dfrac{\partial t_i}{\partial\theta_i}\dfrac{\partial\tau_i}{\partial t_j} < 0$ (part (iii) and (6)). *Q.E.D.*

Appendix 2: Proof of Lemma 2

$u_i(\theta_1,\theta_2;\theta) = u_i^m(\theta_1,\theta_2) + r(\theta_1,\theta_2)\cdot(\theta - \theta^m)\overline{k}_i$. Therefore $u_i(\theta_1^g,\theta_2^g;\theta) - u_i(\theta^m,\theta^m;\theta) = u_i^m(\theta_1^g,\theta_2^g) - u_i^m(\theta^m,\theta^m) + (r(\theta_1^g,\theta_2^g) - r(\theta^m,\theta^m))\cdot(\theta-\theta^m)\overline{k}_i$. Note that $(r(\theta_1^g,\theta_2^g) - r(\theta^m,\theta^m))\cdot(\theta-\theta^m) > 0$ for all $\theta < \theta^m$, and $(r(\theta_1^g,\theta_2^g) - r(\theta^m,\theta^m))\cdot(\theta-\theta^m) < 0$ for all $\theta > \theta^m$. Then the result of Lemma 2 (i) (ii) follows. *Q.E.D.*

Appendix 3: Proof of Proposition 1

Begin with the Stage-3 equilibrium allocation of capital. In the linear model, solving (1) and (2) gives:

$$k_i(t_1,t_2) = s_i\overline{k}_i + s_j\overline{k}_j + \frac{s_j}{2}\left((a_i - a_j) - (t_i - t_j)\right). \tag{A.4}$$

Another benchmark, the first-best solution in (4) is:

$$k_i^* = s_i\overline{k}_i + s_j\overline{k}_j + \frac{s_j}{2}\left(a_i - a_j\right). \tag{A.5}$$

In Stage 2, from (A.1) we have:

$$t_i = f_j''\frac{s_i}{s_j}\cdot(\theta_i\overline{k}_i - k_i(t_1,t_2)),\ j \neq i. \tag{A.6}$$

Under the suppositions of $s_i = s_j = 1/2$ and $\overline{k}_i = \overline{k}_j = \overline{k}$, from (A.4) and $(A.6)$, we have

$$t_i(\theta_1, \theta_2) = 2\overline{k} + \frac{a_i - a_j}{4} - \frac{(3\theta_i + \theta_j)\overline{k}}{2},$$

from which we derive (14). Also,

$$k_i(\theta_1, \theta_2) \equiv k_i(t_1(\theta_1, \theta_2), t_2(\theta_1, \theta_2)) = \overline{k} + \frac{1}{8}\left((a_i - a_j) + 2(\theta_i - \theta_j)\overline{k}\right). \tag{A.7}$$

In the linear model, (8) is equivalent to:

$$\theta^m - \theta_i = -\frac{s_j}{s_i}\left(\theta^m - \frac{k_i(\theta_1, \theta_2)}{\overline{k}_i}\right). \tag{A.8}$$

Solving (A.7) and (A.8) derives (13) of the text, from which we derive Proposition 1 (i). In turn, from (A.5) and (A.7) we have

$$k_i(\theta_1^g, \theta_2^g) = \overline{k} - \frac{(-1)^i \delta \overline{k}}{12}, \quad k_i(\theta^m, \theta^m) = \overline{k} - \frac{(-1)^i \delta \overline{k}}{8}, \quad k_i^* = \overline{k} - \frac{(-1)^i \delta \overline{k}}{4} \ (i = 1, 2). \tag{A.9}$$

These equations lead to Proposition 1 (ii). Also, $r(\theta_1^g, \theta_2^g) - r(\theta^m, \theta^m) = 2\overline{k}(\theta^m - 1) < 0$, so the conclusion of Lemma 2 holds. *Q.E.D.*

Appendix 4: Proof of Proposition 2

Under the suppositions of $s_i = s_j = 1/2$ and $\overline{k}_i = \overline{k}_j = \overline{k}$, the difference of the median-voter's utilities under strategic delegation and under self-representation is

$$u_1^m(\theta_1^g, \theta_2^g) - u_1^m(\theta^m, \theta^m) = -\frac{7\overline{k}^2}{576}\left(\delta + \frac{24(\sqrt{15}-1)}{7}(1-\theta^m)\right)\left(\delta - \frac{24(\sqrt{15}+1)}{7}(1-\theta^m)\right) \gtrless 0$$
$$\iff \delta \lessgtr \frac{24(\sqrt{15}+1)}{7}(1-\theta^m) \equiv \delta^1$$

$$u_2^m(\theta_1^g, \theta_2^g) - u_2^m(\theta^m, \theta^m) = -\frac{7\overline{k}^2}{576}\left(\delta + \frac{24(\sqrt{15}+1)}{7}(1-\theta^m)\right)\left(\delta - \frac{24(\sqrt{15}-1)}{7}(1-\theta^m)\right) \gtrless 0$$
$$\iff \delta \lessgtr \frac{24(\sqrt{15}-1)}{7}(1-\theta^m) \equiv \delta^2.$$

Since $\dfrac{\delta^2}{\delta^0} = \dfrac{2(\sqrt{15}-1)}{7}$ $(\approx 0.82085) < \dfrac{\delta^1}{\delta^0} = \dfrac{2(\sqrt{15}+1)}{7}$ (≈ 1.3923), we obtain Proposition 2. *Q.E.D.*

Appendix 5: Proof of Proposition 3

Under the suppositions of $a_i = a_j = a$ and $\overline{k}_i = \overline{k}_j = \overline{k}$, from (A.4) and ($A$.6), we derive

$$t_i(\theta_1, \theta_2) = -\frac{(-\theta_i s_j^2 + \theta_j s_j^2 + \theta_i - 1)\overline{k}}{s_j}, \; k_i(\theta_1, \theta_2) = \frac{(-\theta_j s_j^2 + \theta_i s_i^2 + 1)\overline{k}}{2s_i}, \tag{A.10}$$

Solving (A.8) and (A.10) derives (15) of the text. $\theta_i^g - \theta^m = -\frac{(1-s_i)(1+s_i)(1-\theta^m)}{3s_i^2} < 0$ $(i = 1, 2)$ and $\theta_1^g - \theta_2^g = \frac{(2s_1 - 1)(1-\theta^m)}{3s_1^2 s_2^2} > 0$, so we obtain Proposition 3 (i). From (A.10) we have

$$k_i(\theta_1^g, \theta_2^g) = \frac{(2s_i\theta^m + s_i - \theta^m + 1)\overline{k}}{3s_i}, \; k_i(\theta^m, \theta^m) = \frac{(2s_i\theta^m - \theta^m + 1)\overline{k}}{2s_i}. \tag{A.11}$$

From (A.5) we have $k_1^* = k_2^* = \overline{k}$. Note that

$$k_i(\theta_1^g, \theta_2^g) - k_i(\theta^m, \theta^m) = \frac{(1-\theta^m)(2s_i - 1)\overline{k}}{6s_i}, \quad k_i^* - k_i(\theta_1^g, \theta_2^g) = \frac{(1-\theta^m)(2s_i - 1)\overline{k}}{3s_i} \; (i = 1, 2).$$

Since $2s_1 - 1 > 0$ and $2s_2 - 1 < 0$, we obtain Proposition 3. Also, $r(\theta_1^g, \theta_2^g) - r(\theta^m, \theta^m) = \frac{(-2s_1^2 + 2s_1 + 1)(\theta^m - 1)\overline{k}}{3s_1 s_2} < 0$, so the conclusion of Lemma 2 holds. *Q.E.D.*

Appendix 6: Proof of Proposition 4

Under the suppositions of $a_i = a_j = a$ and $\overline{k}_i = \overline{k}_j = \overline{k}$, the assertion in Proposition 4 (i) follows from[22]

$$u_i^m(\theta_1^g, \theta_2^g) - u_i^m(\theta^m, \theta^m) = \frac{(1-\theta^m)^2(1+s_i)(-4s_i^2 + 8s_i + 3)\overline{k}^2}{36s_i^2 s_j} > 0 \; (i = 1, 2).$$

Moreover,

$$u_1(\theta_1^g, \theta_2^g; \theta) - u_2(\theta_1^g, \theta_2^g; \theta) \;\; = \;\; \frac{(1-\theta^m)^2(1-2s_1)\overline{k}^2}{3s_1^2 s_2^2} < 0 \text{ for all } \theta.$$

Thus Proposition 4 (ii) is verified. *Q.E.D.*

[22]For the citizens with $\theta_i = 1$, $u_i(\theta_1^g, \theta_2^g; 1) - u_i(\theta^m, \theta^m; 1) = \frac{(1-\theta^m)^2(2s_i - 1)(10s_i^2 - 5s_i - 3)\overline{k}^2}{36s_i^2 s_j}$ $(i = 1, 2)$. $u_2(\theta_1^g, \theta_2^g; 1) - u_2(\theta^m, \theta^m; 1) > 0$ for all $s_1 \in (0.5, 1)$, and $u_1(\theta_1^g, \theta_2^g; 1) - u_1(\theta^m, \theta^m; 1) > 0$ for sufficiently high s_1.

Appendix 7: Proof of Proposition 5

Under the suppositions of $a_i = a_j = a$ and $s_i = s_j = 1/2$, from (A.4) and $(A.6)$, we derive

$$t_i(\theta_1, \theta_2) = \overline{k}_1 + \overline{k}_2 - \frac{(3\theta_i \overline{k}_i + \theta_j \overline{k}_j)}{2},\ k_i(\theta_1, \theta_2) = \frac{1}{2}\overline{k}_1 + \frac{1}{2}\overline{k}_2 + \frac{1}{4}\left(\theta_i \overline{k}_i - \theta_j \overline{k}_j\right). \tag{A.12}$$

Solving (A.8) and (A.12) derives (16) of the text. $\theta_2^g < \theta^m$ and $\theta_1^g - \theta^m = \dfrac{\xi(4\theta^m - 3) - 6(1-\theta^m)}{6(1+\xi)}$, so we obtain Proposition 5 (i). From (A.12) we have

$$k_i(\theta_1^g, \theta_2^g) = \frac{1}{2}\overline{k}_1 + \frac{1}{2}\overline{k}_2 - \frac{1}{3}(-1)^i \xi \theta^m \overline{k}_2,\ k_i(\theta^m, \theta^m) = \frac{1}{2}\overline{k}_1 + \frac{1}{2}\overline{k}_2 - \frac{1}{4}(-1)^i \xi \theta^m \overline{k}_2\ (i = 1, 2) \tag{A.13}$$

From (A.5) we have $k_1^* = k_2^* = \frac{1}{2}\overline{k}_1 + \frac{1}{2}\overline{k}_2$. These equations lead to Proposition 5 (ii). Also, $r(\theta_1^g, \theta_2^g) - r(\theta^m, \theta^m) = (\overline{k}_1 + \overline{k}_2)(\theta^m - 1) < 0$, so the conclusion of Lemma 2 holds. *Q.E.D.*

Appendix 8: Proof of Proposition 6

Under the suppositions of $a_i = a_j = a$ and $s_i = s_j = 1/2$, the difference of the median-voter's utilities under strategic delegation and under self-representation is, for $\theta^m > \dfrac{78 - 6\sqrt{15}}{77} \equiv \theta^1 \approx$ 0.71120,

$$\begin{aligned} u_1^m(\theta_1^g, \theta_2^g) - u_1^m(\theta^m, \theta^m) &= -\frac{(\overline{k}_2)^2}{144 \cdot 77}\left(\left(78 + 6\sqrt{15} - 77\,\theta^m\right)\xi + 12\left(13 + \sqrt{15}\right)(1-\theta^m)\right) \times \\ &\quad \left(\left(77\,\theta^m - 78 + 6\sqrt{15}\right)\xi - 12\left(13 - \sqrt{15}\right)(1-\theta^m)\right) \gtreqless 0 \\ &\iff \xi \lesseqgtr \frac{12(13-\sqrt{15})(1-\theta^m)}{77\,\theta^m - 78 + 6\sqrt{15}} \equiv \xi^1(\theta^m). \end{aligned}$$

$\xi^1(\theta^m) > 0$ for all $\theta^m \in (\theta^1, 1)$, and $\xi^1(\theta^m) < \xi^0(\theta^m)$ for all $\theta^m \in \left(\dfrac{3}{4}, 1\right)$.

For $\theta^m > \dfrac{66 - 6\sqrt{15}}{53} \equiv \theta^2 \approx 0.80683$,

$$\begin{aligned} u_2^m(\theta_1^g, \theta_2^g) - u_2^m(\theta^m, \theta^m) &= -\frac{(\overline{k}_2)^2}{144 \cdot 53}\left(\left(66 + 6\sqrt{15} - 53\,\theta^m\right)\xi + 12\left(11 + \sqrt{15}\right)(1-\theta^m)\right) \times \\ &\quad \left(\left(53\,\theta^m - 66 + 6\sqrt{15}\right)\xi - 12\left(11 - \sqrt{15}\right)(1-\theta^m)\right) \gtreqless 0 \\ &\iff \xi \lesseqgtr \frac{12(11-\sqrt{15})(1-\theta^m)}{53\,\theta^m - 66 + 6\sqrt{15}} \equiv \xi^2(\theta^m). \end{aligned}$$

$\xi^2(\theta^m) > \xi^0(\theta^m)$ for all $\theta^m \in (\theta^2, 1)$. For $\theta^m \le \theta^i$, $u_i^m(\theta_1^g, \theta_2^g) - u_i^m(\theta^m, \theta^m) > 0$ for all $\xi > 0$ $(i = 1, 2)$. We therefore obtain Proposition 6. *Q.E.D.*

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