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Essays on Fiscal Competition under Representative Democracy

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Essays on Fiscal Competition under Representative Democracy

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Contents

Chapter 1

Introuction

1.1 Democracy and Globalization

A nation can not be organized without a government. As well, a government can not be organized without politics. This is just a basic rule for a nation. It does not matter where or when. If people live together, they need politics. Simply, it is because people are different from each other in many respects: age, sex, character, preference, religion, and so forth. However, they have to sum up their opinions and determine what they do and what they do not, as one nation. That is why politics is indispensable for a nation.

Nevertheless, political regimes, or forms of governments, are multifarious: socialism, totalitarianism, authoritarianism, communism, and democracy. While the main currents of it in each country keep shifting with the times, it is suggested that political regimes can be a crucial factor to decide whether a nation fails or succeeds in many studies of economic history and, recently, economic theory. Particularly, democracy is evaluated as driving force of high economic performance, compared to other regimes. As Acemoglu and Robinson (2013) points out, people in a nation under democracy have not only a right to vote, but also property right in a broad sense and property right is prerequisite for formation of economy with market, that is, capitalist economy. Besides, as well-known, market is so powerful to allocate goods to people who want them with appropriate amounts. Therefore, we can say that democracy and economy with market are two sides of the same coin and explain why many of countries succeeding economically are applying democracy as their political regime.

Historically, democracy has been one of the main collective decision-making systems in most societies since the days of the ancient Greek city-state of Athens. In particular, none of the highly developed Western countries of modern times have adopted any other political regime. People vote not only in North America and Europe (the United States, the United Kingdom, Canada, France, Germany, Italy, etc.) but even in East Asia, Japan, Korea, Chinese Taipei, and so on. They vote to better their lives and to express their vision about their country

and what policies it should implement. The people of the above countries have a right to vote—a fundamental right for every citizen—to voice their opinions about the society.

However, the direct democracy of ancient Greece is different from the indirect democracy, also called representative democracy, of the modern era. Whereas people in ancient Greece voted to determine policies, we go to elections today to choose a policymaker. Policymakers, as their name suggests, are people's representatives who are delegated authority to decide what policies to implement and how to do so. During elections, we give a great deal of thought to the choice of candidates, considering that the policies implemented after elections depend on the election results, or who become policymakers. Before voting, therefore, we must consider the candidates' policy preferences. We express our opinion by voting for a certain candidate. It is in this sense that today's democracy is described as "indirect."

The modern age is very different from the ancient Greek era, and even compared to a hundred or fifty years ago. Today, we live in a highly connected, globalized world. We can travel around the world easily, savor the pleasure of using imported goods, contact friends through Facebook, learn or work in other countries, and invest in foreign enterprises. None of these were possible a hundred years ago. Most of them are accomplished through highly developed technologies and market integration attained recently, particularly in the latter half of the 20th century. Integration is one of the aspects of globalization. Today, we cannot avoid the effects of globalization or the influence of foreign countries or regions, with their different implications.

Globalization has affected not only our lifestyle but also the politics and policies of countries (Rodrik, 2012). Policy environments have been changed so drastically, for instance, by market integration. Market integrations can turn immobile production factors into mobile factors that can move from countries with unfavorable conditions to countries with favorable conditions. Therefore, governments must formulate favorable policies to attract production factors to the country. This is a responsibility that globalization has added to governments' concerns. Taking account of government formations through voting by citizens, "governments' concerns" implies "citizens' concerns". Characteristics of governments and their policies can be changed by globalization, or more specifically, market integrations, because citizens confronting elections have to take them into consideration.

Then, how are they changed into? As a result of voting by citizens under globalized environment, do governments become more left-winged, that is, more redistributive? Or, do they rather become more right-winged, that is, less redistributive? Some countries may become more, and some other countries may become less, but why? Can we rationalize this asymmetry of political features by connecting them with asymmetry of other economic factors that characterize countries?

This is our question: How globalization affects and changes politics into?

1.2 Approaches

To give answers to the questions from the viewpoint of economics, we have to model governments under representative democracy in the globalized world and examine how they are changed.

As already mentioned above, market integrations are one aspect of globalization and governments are involved in competitions for production factors which are mobile among countries. Governments have to offer favorable policies to attract them to their countries; public policies controlled by governments for it are, for instance, tax rates levied on mobile factors, amounts of public investment, environmental standards, labor standards, and so on. If not so, they, or firms in their countries, lose production factors and can not produce goods. In fact, average corporate tax rate of EU-27 countries had been lowered about 10% (from higher than 35% to lower than 25%) in 15 years of 1995 to 2010. This phenomenon can be interpreted as a result of the competition for firms among countries in Europe. In economic studies, this is, what is called, fiscal competition. Following the basic concept proposed by Oates (1972), Zodrow and Mieszkowski (1986) and Wilson (1986) refined it theoretically. After that, the literature of fiscal competition have developed so vastly and intensively. Hence, it is meaningful to apply fiscal competition to capture and describe one aspect of the globalized world.

Then, how can we capture and describe a feature of democracy, particularly, political regime of representative democracy? Even in the group of democratized countries cited above, their forms of representative democracy are highly diversified country by country. For instance, some countries as the United States, France, Germany, and so forth, adopt presidential government system; in those governments, administrative power and legislative power are perfectly independent of each other. On the other hand, some other countries as Japan, the United Kingdom, and so forth, adopt parliament government system; in those countries, the two power are imperfectly independent of each other. It is because that, under the latter system, a cabinet is constructed on the confidence of and also must be collectively responsible to an assembly. Additionally, countries under representative democracy are different in systems and rules of elections, types and numbers of political parties, social institutions and constraints of politics—many other respects. We have to extremely simplify and model it, avoiding these complexity of the political systems and capturing the exact feature of representative democracy. We can define it simply as the political regime in which policymakers chosen through voting by citizens determine public policies of their country; policymakers are delegated the authority to make decisions about public matters. We take only this respect into consideration and ignore others.

Therefore, we construct a two-stage model in order to see how globalization changes politics into. In the first stage, an election to pick a policymaker is held in each country. Universal suffrage is assumed in this election. There does not exist any kind of social constraints for any people to vote. Also, every citizen is assumed to be a candidate and they can not refuse it. With this assumption,

citizens can choose a policymaker from a full menu; we can exclude a case where a citizen can not choose a candidate who he/she really wishes to vote for, because the candidate does not run in the elections from some reasons.

In the second stage after the election, the policymaker chosen through voting determines public policies in his/her country under environment of fiscal competition. We assume that policymakers can behave so much selfishly; his/her objective function to maximize here is not social welfare of his/her whole country but only his/her own utility. This assumption might seem quite strict. Policymakers might be self-conscience and take care of other citizens' thought or next elections. However, by setting this assumption, we can clear problems of asymmetric informations and commitment out of the models. In fact, a policymaker might be a liar, who does not do what he/she pledges in election. Conversely, a policymaker might be more benevolent than voters' conjecture. We rule out them all. In our models, candidates are assumed to declare to maximize their utility as their public commitment in the election, and citizens are assumed to determine who they vote for, knowing their commitments.

In addition, heterogeneity among citizens, or candidates in elections, with respect to amount of initially endowed capital is assumed to exist in a country, which implies that there are the poor, the rich, and the moderate. It makes difference in incentives of voting citizens and policymakers. As we can understand intuitively, if a policymaker is picked from poor group of that country, public policy would become more redistributive, or left-winged. On the other hand, if a policymaker is picked from rich group of that country, public policy would become less redistributive, or right-winged. This can be a simple measure to see how globalization change politics of countries into.

Hence, we focus on just one question "Who is the Policymaker?" with this approach and its variations.

1.3 Abstracts of Chapters

In the following chapters, we examine how politics and policies in each country can be changed by globalization of the world. An overview of the contents is summarized as below.

Chapter 2

In Chapter 2, we make a survey of the literature of fiscal competition, particularly, with political approaches. The goal of this chapter is to arrive at the benchmark result derived by Ihori and Yang (2009).

However, we also need to look back why the literature of fiscal competition have been developed with the historical background in those days. Additionally, we see how political economy approaches have been applied in the literature to open up "the black box" of governments, which have been assumed to be just benevolent existences without any political processes in most studies. The pioneering work to incorporate a political process into a fiscal competition model

is Persson and Tabellini (1992), but political economy approaches on fiscal competition are expanded in many directions, which can be classified in five ways as follows : 1) Representative democracy models; 2) Direct democracy models; 3) Lobbying models; 4) Tax competition versus tax coordination models; 5) Leviathan models. What we study in the main body in this dissertation belongs to 1) Representative democracy models as well as Ihori and Yang (2009) does.

As mentioned above, we give a brief sketch of the model of Ihori and Yang (2009) and show its results. They apply the two-stage citizen-candidate model and derive the result that citizens whose capital share is lower than that of the median of the distribution of capital endowment are picked as policymakers through the election in both countries, with the assumption of symmetry of the countries. This is the benchmark of our studies.

Chapter 3

In chapter 3, we construct the asymmetric capital tax competition model following Ihori and Yang (2009). In each country, a capital tax rate is determined by a policymaker, who is elected by voting, not by benevolent government as usually assumed in standard tax competition models.

This is a simple two-stage game: In the first stage, an election to pick a policymaker is held in each country. After that, the policymaker chooses a tax rate levied on capital employed in each country. Significant features of this model are as follows: 1) There is heterogeneity among citizens about amount of initially endowed capital. 2) Once a citizen is chosen for a policymaker, he/she decides a tax policy as he/she wants, in order to maximize his/her utility. Due to the heterogeneity, policies decided by a citizen are different from those decided by other citizen. 3) In the election, every citizen has the right to vote and run in the election, and no one can refuse it. Again, due to the heterogeneity, a voting behavior of a citizen is different from that of other citizens. 4) The countries are asymmetric in production technology, or productive efficiency, of firms in each country. These features are consistently the same through this dissertation, except for policy instruments and their number.

As a result, we find that the policymaker in country H, which is characterized with *higher* productive efficiency of firms, is relatively poor, compared to the policymaker in country L, which is characterized with *lower* productive efficiency of firms. Besides, this gap of the policymakers' location in the distributions of capital endowment are spread out, when the asymmetry between the countries becomes larger. On the other hand, when the countries are exactly symmetric, the policymakers in both countries are picked from the poor group, which is defined as a group below the median of the distribution. Although the mechanism is quite different, the result is consistent with Persson and Tabellini (1992) and Ihori and Yang (2009).

Chapter 4

In Chapter 4, a public policy determined by a policymaker is changed; while a policymaker has the authority to determine capital tax rate and the tax revenue is redistributed to citizens in a lump-sum manner in Chapter 3, a policymaker has the authority to determine amount of public investment, which augment productive efficiency of firms in that country, and the public expenditure for it is burdened by citizens in a lump-sum manner. Modification from Chapter 3 is just the one point. However, the diametrically opposite results are obtained.

When the countries are symmetric, the policymaker is picked from the rich group, which is defined as a group above the median of the distribution of capital endowment, in each country. Even though Persson and Tabellini (1992), Ihori and Yang (2009), and Chapter 3 of this dissertation show that policymakers are picked from poor group of citizens, it does not fit our intuition that politicians are rich in the real world. Therefore, from this viewpoint, this result in Chapter 4 gives an explanation to why politicians are rich.

Even when the countries are asymmetric, the axis of asymmetry in the policymakers' location in the distribution is still above the median. Besides, the policymaker in country H, which has basically higher productive efficiency, is relatively rich, compared to the policymaker in country L, which has lower productive efficiency. This is also the diametrically opposite result to what we derive in Chapter 3. Only when the asymmetry between the countries is sufficiently large, a poor citizen is picked as a policymaker in country L.

Chapter 5

In Chapter 5, we examine the case where the number of asymmetric factors is more than one; the asymmetry in capital endowment is incorporated into the basic model provided in Chapter 3, and we see the effect of difference-in-capital-endowment on results of elections, asking whether it expands or shrinks the gap of policymakers' locations in the distribution, which is caused by the asymmetry in productive efficiency of firms in each country. Particularly, we assume a situation where country H with relatively high productive efficiency has initially more capital endowment than country L does. This situation reminds us of the relation between the United States and Japan, or between Japan and Korea, and so forth.

If we focus only on asymmetry in capital endowment, the effect on election results is reversed from the case with asymmetry in productive efficiency; the policymaker in country H, which is endowed with more capital than country L is, is relatively rich, compared to the policymaker in country L. The effects of higher(lower) productive efficiency and more(less) capital endowment work opposite directions. If the two asymmetric factors coexist, they cancel out each other. Therefore, the asymmetry in capital endowment works to shrink the gap of the policymaker's location in the distribution caused by the asymmetry in technological level.

Chapter 6

In Chapter 6, we conclude this dissertation. The results we derive in each chapters are summarized again, and the mechanisms and the determinants of how elections are affected by globalization of the world are comprehensively explained. Finally, we end up with remained subjects for future research.

Chapter 2

Political Approaches to Fiscal Competition

This chapter provides an overview of the existing literature on tax competition. It starts by discussing the real origin of the concept of tax competition without any theoretical refinement by mathematical tools and its subsequent development. Thereafter, the chapter provides an introduction to the political economy approaches to fiscal competition and classifies them into basic models. In doing so, it opens up the "black box" of significant assumptions about governments in the theoretical model and extends our knowledge about the relation between tax policy and politics in the framework of tax competition. This overview, which is essentially the focal point of this dissertation paper, moves on to detailed explanations about models of tax competition with political economy approaches.

2.1 Basic Concept of Fiscal Competition

2.1.1 The Biginning

The modern world we live in and its structure are changing very rapidly, with many changes having taken place especially in the latter half of the 20th century. There are many things we would never have dreamed of accomplishing in the former half of the 20th century. Today, however, most of these things can be accomplished easily, mostly at little or no cost. Technological developments have made this possible; we import products from foreign countries, we communicate with friends halfway across the world, and see each other's images in real time over computer monitors thanks to the Internet. The average Japanese citizen can invest his or her money not only in stocks of TOYOTA or Sony, but also in stocks of Apple and Google, and people living in the United States can do the same. Although we may live miles apart, we are closely connected with each other. This is one aspect of what we call globalization.

Globalization has been changing the lifestyles of citizens, strategies of firms,

and public policies of governments across the world. While we can invest across borders, there is nevertheless the incentive to retain much-needed capital inside a country's borders and even attract foreign capital to it. Traditionally, the capital owned by the citizens of a country was employed by the firms of that country; however, this does not hold true any longer. Capital is now a mobile factor among countries and is just one of the targets governments compete for. Governments have to compete against each other for capital to produce more goods and ensure citizen wellbeing within their jurisdictions. To do this, they employ fiscal policies that create conditions for the capital to stay in or flow into their respective countries. In other words, globalization causes fiscal competition among governments. Additionally, the policy instrument often employed for this purpose is the capital tax rate.

Every study in the literature on tax competition quotes the well-known argument made by Oates (1972). He had the foresight to predict how the globalized world would look like in the future, that is, today. He predicted the result of tax competition among governments in a world with high capital mobility:

> *"The result of tax competition may well be a tendency toward less than efficient levels of output of local services. In an attempt to keep taxes low to attract business investment, local officials may hold spending below those levels for which marginal benefits equal marginal costs, particularly for those programs that do not offer direct benefits to local business."*

In other words, Oates (1972) provided the intuitive argument that when governments involved in tax competition finance their local public goods and services, their provision levels would be inefficiently low, as they would have an incentive to cut capital tax rates to keep and attract the capital employed within their jurisdictions. This is what he called the "race to the bottom" in the context of tax competition. In a broader sense, "race to the bottom" indicates government deregulation caused by competition for economic activity in its jurisdiction, and it can be unfavorable or even harmful to its citizens and the environment as a whole. Even though the concept emerged in the United States between the late 19th and the early 20th centuries, it has a particular meaning in that interregional tax competition causes inefficiently low capital tax rates and inefficient provision of local public goods in each jurisdiction involved in the competition.

Zodrow and Mieszkowski (1986) and Wilson (1986) (hereafter "ZMW") refined Oates' intuitive argument to develop their theoretical models, which are recognized as pioneering works of theoretical analysis on tax competition. Their basic proposition was that interregional tax competition leads to inefficient levels of capital tax rates and local public goods. Most of the studies that followed took ZMW as a benchmark. Additionally, it is worth referring to the historical background during the late 1980s and the early 1990s. After the Treaty of the European Union and the North American Free Trade Agreement (NAFTA) were signed in 1992, there was a certain tendency toward integrating various markets and globalization. Therefore, in the context of public economics, it became

necessary to analyze strategic behaviors of governments involved in the competition caused by globalization, particularly the integration of capital markets. This gave rise to studies on tax competition.

2.1.2 The Frameworks of ZMW

There are some differences between the models of Zodrow and Mieszkowski (1986) and Wilson (1986); the former is a one-production sector model, while the latter consists of three production sectors: traded goods, non-traded goods, and public goods. Thus, the manner of analysis also differs. However, the main characteristics of their models and the results derived from their analyses have common features. The important features of their analyses are that they are not just simple small open models, but they are also general equilibrium models consisting of a number of regions, which examine the effect of decentralized policymaking in tax competition on the whole society from a normative view.

The ZMW frameworks are based on a theoretical model in which consumption goods are produced using an immobile factor (land or labor) and a mobile factor (capital), and public policies (capital tax rate and level of public goods provision) are determined by decentralized policymaking. The key features of their models are enumerated as follows: 1) An economy consists of many symmetric small regions, which means that each region is a price taker in the capital market; 2) People in the economy are homogeneous; 3) There is no migration among regions; 4) The total amount of capital and its supply are fixed, there is no choice between consuming and saving, and all individuals invest their endowed capital; 5) The immobile factor supply is also fixed. When the immobile factor is labor, there is no choice between leisure and work. All individuals spend all of their time working; 6) The immobile factor in a jurisdiction is owned by its residents and not by foreigners; 7) Governments finance their local public goods and services using the grounded tax on capital; and 8) The objective of regional governments is to maximize the welfare of their citizens.

As mentioned previously, Oates' (1972) argument that interregional tax competition leads to inefficient levels of capital tax rates and public goods production was refined by ZMW in their theoretical models. The essence of its mechanism applies to situations where regions are connected with each other through mobile capital; thus, the decision-making of each regional government is affected by that of the other governments, and a strategic environment emerges. When a regional government increases (decreases) its tax rate, its policymaking gives rise to an outflow (inflow) of capital and leads to loss (gain) of welfare in that region. However, it also gives rise to inflow (outflow) of capital and leads to gain (loss) of welfare in other regions at the same time, as the total amount of capital in the whole economy is fixed. Each regional government decides on their capital tax rates to avoid capital outflow and attract capital inflow. They do not take the welfare of other regions into account in this decision-making process. Therefore, such policymaking gives rise to inefficient levels of capital tax rates and local public goods provision. Wildasin (1989) provided an intuitive interpretation of this externality and named it "fiscal externality."

2.1.3 Developments after ZMW

Since the theoretical refinements by ZMW, the literature on tax competition has developed in many directions, namely weakening ZMW's assumptions, incorporating more types of tax, introducing the timing of the game, studying other factors causing inefficiency, considering fiscal transfers among regions and agglomeration economies, and so forth.

One of these extensions concerns the size of regions in the model. As long as we assume that the number of regions in the economy is large enough (in other words, the regions are small enough), they are regarded as price takers in the capital market. However, when we assume the number of regions is finite and small enough, there are substantial effects on the price of capital in the market. Changes in demand for capital in such regions are able to affect the demand for capital for the whole economy, thereby changing the net rate of return to capital; the regions are now price makers in the market.

Moreover, another externality, different from a fiscal externality, emerges when we suppose that the regions are not only large enough, but they are also asymmetric in their scale, productivity, and so on. This is a pecuniary externality. Pecuniary externality is captured and defined as follows. In an asymmetric equilibrium of asymmetric regions, capital flow between the regions occurs in response to the gap in tax rates in each region. For a region with pricing power in the capital market, the capital exporting (importing) region has an incentive to increase (decrease) the net rate of return to capital by lowering (heightening) its capital tax rate, or even subsidizing it, so that it can export (import) capital at a higher (lower) price. The resulting interregional income transfer corresponds to an interregional externality caused by local public policy, and it has been called a pecuniary externality since the pioneering work of DePater and Myers (1994). A pecuniary externality is generally known as a factor that distorts the allocation of capital in an economy and decreases income as a whole.

The focus of this dissertation paper is the asymmetric tax competition between regions with pricing power in the capital market. Moreover, the manner in which the distortion of capital allocation due to a pecuniary externality can be softened is discussed in appendix of Chapter 5.

2.2 Tax Competition with Political Economy

Most of the studies on tax competition follow the ZMW framework. These models, assume regional governments to be merely entities that maximize the social welfare of their own regions; in other words, such a model essentially treats the regional government as a "black box" in that there is no political process. There is no voting by citizens in each region, and there is no representative democracy unlike the situation in most Western and certain other countries today. There is no political pressure exerted by interest groups on policymakers to curtail wasteful behavior, and there is no lobbying. Unlike real life, there are

no unscrupulous politicians whose main aim is to maximize their own profits; unbelievably, the only politicians are those who maximize social welfare first. There exist only benevolent governments that make policy decisions focused on ensuring the happiness of their citizens.

Persson and Tabellini (1992) were the first to incorporate the political process into a simple model of tax competition. They focused on the European politics of the day, namely the unification of their regional markets. They predicted that the structure and character of European politics would change in favor of left-winged governments, with preferences toward redistribution of the effects of globalization captured by the increasing production factor or capital mobility. An increment in capital mobility causes not only an inefficient lowering of both the imposed tax rate and the provision of local public goods in each region, but it also changes the characteristics of policymakers who are elected through citizens' votes under representative democracy.

Persson and Tabellini (1992) is a pioneering study on tax competition with political economy approaches, and it has been expanded in many directions. These directions of theoretical analysis can be classified in five ways as follows: 1) Representative democracy models, like that in Persson and Tabellini (1992), in which the region's citizens vote for candidates, and the elected candidate takes decisions on the policies of his/her respective region; 2) Direct democracy models in which citizens vote directly to decide policies to be implemented in their regions, and there is no politician representing citizens' opinions or preferences; 3) Lobbying models in which various interest groups put political pressure on policymakers regarding policy decisions in order to seek special treatments favorable to themselves; 4) Tax competition versus tax coordination models in which there is upward pressure on the tax rate from tax coordination (as pointed out in the literature on public choice), accompanied by downward pressure on the tax rate from tax competition, and the possibility of the two canceling each other out is examined; 5) Leviathan models in which governments are not benevolent and make decisions on regional policies as if they were dictators: In other words, their objective functions differ from the social welfare maximizing problem.

The remainder of this section provides a review of the literature on tax competition with political economy approaches along the lines of the abovementioned classifications.

2.2.1 Representative Democracy Models

Persson and Tabellini (1992) examined the effects of incremental capital mobility among regions on the capital tax rate as well as on the results of elections conducted to select policymakers in each region. Consequently, they showed the various aspects of politics in the globalized world, which is characterized by the integration of capital markets, particularly the changes of governments into left-winged governments, or in other words, highly taxing governments. An important feature of Persson and Tabellini (1992) is the heterogeneity among citizens about the initially endowed capital amount, which implies the existence

of heterogeneity of preference for tax rates. In addition, the citizen located in the median of the capital endowment distribution is the decisive voter in the election but not for policymaking. This model is constructed as a two-stage game; citizens choose a policymaker through an election in the first stage, and the policymaker elected by them takes decisions on the capital tax rate in the second stage. In this model structure, the median voters in each region can foresee that the equilibrium tax rate would be too low if tax rates were set by the median voters themselves because of downward pressure from tax competition in the next stage. Hence, the median voters have an incentive to delegate to other citizens in the election. The following incentives arise: delegate the right to set a tax rate to (1) a citizen, who tends to set a higher tax rate than the median voters, or (2) a "poor" citizen with less capital endowment. This high tax rate is canceled out by the downward pressure from tax competition, and the median voters can consequently obtain the first-best result for their initially endowed capital amount in equilibrium. The latter result, namely that the power to set the tax rate is delegated to the poor, can be interpreted in that the leading party in the Diet, or the government as a whole, is likely to be left-winged, or that the government favors a policy of redistribution in a globalizing economy. From this viewpoint, they proposed that a political regime representative of democracy would soften the pressure on the capital tax rate by increments to capital mobility. Thus, they sounded the alarm on the "easy view," that in neglecting the political process, capital mobility can lead to inefficiently low tax rates and inefficient provision of local public goods. However, their model differs somewhat from the standard tax competition models; the production sector does not exist explicitly, and the taxpayer is not a capital employer but a capital owner.

Gotthschalk and Peters (2003) extended the model of Persson and Tabellini (1992) to shed light on redistributive taxation by comparing the results under representative democracy and direct democracy. With foreknowledge about the reduced pressure on redistributive policy caused by tax competition, the median voters delegate the right to set a tax rate to the pro-redistributive-policy citizen. They argued that this mechanism explains why the redistributive tax rate is not lowered as predicted in many of the tax competition studies without a political process. Besides, they compared the tax rates in equilibrium under representative democracy and under a direct democracy. They concluded that the tax rate in equilibrium for the former case is always higher, and the gap broadens with globalization.

Using explicit production sectors and a source-based taxation system on capital, as shown in the canonical models of tax competition, Ihori and Yang (2009) explored the relation between tax competition among symmetric regions and political competition within each region. They examined the optimal provision of local public goods under representative democracy in a manner similar to that of Osborne and Slivinski (1996) and Besley and Coate (1997). While the model is quite different from those of Persson and Tabellini (1992) and Gottschalk and Peters (2003), the same mechanism applies; the median voters in each region have the foresight of lowering the pressure on the capital tax rate and the level

of provision of local public goods. They delegate the right to set the tax rate to a citizen with a stronger preference for the public good. Ihori and Yang's (2009) main finding was that local public goods in each region are sufficiently provided with a certain intensity of tax competition. This framework is applied to the analysis presented in this dissertation paper (more details of which appear in chapters 3 to 5), but the focus is changed to asymmetric fiscal competition and the characteristics of policymakers. Therefore, it is necessary to present a more detailed review of Ihori and Yang (2009) in the next section. Additionally, the term "strategic delegation" in this dissertation paper is defined as the two-stage game structure of Ihori and Yang (2009), which follows Osborne and Slivinski (1996) and Besley and Coate (1997); the decisive voters strategically delegate the right of policymaking to another citizen, taking into account the result of a policy game played by the policymakers elected in the first stage.

While the policymakers in the three models mentioned above are assumed to make decisions on regional policies simultaneously, Pal and Sharma (2012) incorporated political competition under representative democracy into tax competition played sequentially. The leader region sets a tax rate first, and the follower region does so next. They showed that while a poor citizen located at a lower point in a capital endowment distribution is selected as the policymaker in the follower region (a typical result of a symmetric and simultaneous game of strategic delegation), such delegation does not occur in the leader region. This means that the median voter in the leader region does not vote for any other citizen but himself/herself so that he/she becomes a policymaker in equilibrium. The intuition for this result is as follows. First, suppose that there is a simultaneous tax competition without any election process. In this case, the leader region recognizes that the follower region would set a lower tax rate than it, and the regional government also recognizes this fact. Hence, in a case including the election process, when the follower region selects a citizen who has a strong preference for local public goods and tends to set a higher tax rate, it is in effect sending the message "let's avoid the race to the bottom" to the leader region. The leader region, on receiving this message, need not select a poor citizen to prepare a buffer for tax competition in the next stage. Besides, the leader region does not have the incentive to delegate to a rich (or more capital endowed) citizen who is likely to set a low tax rate. Therefore, there is no delegation, and the median voter chooses himself/herself in the leader region.

As we have seen, the framework of strategic delegation with an election process captures significant aspects of representative democracy. However, it is possible that political systems under representative democracy may be divided, as observed in the Western countries having a presidential-congressional system or a parliament system. Janeba and Schjelderup (2009) adopted a comparative politics approach on the level of public goods provision within each region involved in tax competition. They compared the two types of collective decision-making systems in a nation under representative democracy. They showed that tax competition among countries employing the parliamentary political system is harmful for citizens within each region as long as public goods are sufficiently valued in their utility functions, while tax competition among

countries employing the presidential-congressional system is welfare-improving. The key difference between the two political regimes is whether the tax rate and level of public goods provision are determined simultaneously in the policymaking process (these elements are determined simultaneously in the parliamentary system and separately in the presidential-congressional system). This difference can be interpreted in terms of the changes in the composition of the majority agreeing to the policies. The change in the majority composition functions to restrict the possibility of rent-seeking by policymakers. That is why the presidential-congressional system can work to improve social welfare as a whole.

Unlike the comparative politics of representative democracy, Janeba and Wilson (2011) explored the optimal balance for providing public goods between regional and central governments in an economy under interregional tax competition. They assumed heterogeneity of preference on public goods among regions, with the centralized policy being determined through a legislature composed of representatives from each region. Where the authority making the decision on public goods provision is fully decentralized, it is well known that the level of public goods provision is inefficiently low due to interregional tax competition. On the other hand, the fully centralized public policy is also inefficient. This is because of the minimum winning coalition within the legislature when a central policy is determined; while regions that can organize the minimum winning coalition to get a majority in the legislature are able to determine the centralized public policy as close to their preferences as possible, the other regions outside this coalition cannot. Hence, they argued that the optimal extent of public goods provision depends on the balance between the two inefficiencies.

2.2.2 Direct Democracy Models

Even though the world's first regime to practice direct democracy was established in ancient Athens, in modern times, Switzerland is the only country in the world that has instituted direct democracy as its collective decision-making system. However, the political economy approach with direct voting is still more effective and close to real life than that of the "black box" governments, which are assumed to work benevolently toward maximizing the welfare of their own regions. The collective decision-making in the direct voting approach is the simplest mechanism to capture policy outcomes and determine how heterogeneity among citizens affects the policy implemented in that region.

Perroni and Scharf (2001) expressed doubts that the inefficiently lowered tax rate, the standard result of interregional tax competition, is a given for benevolent dictator-like governments. They endogenized the formation of regions and examined how tax competition affects the number of regions and to what extent. Moreover, capital tax rates and the level of public goods provision are determined through direct voting within each region after their formation. With these settings, they showed that tax competition has a welfare-improving function. The intuition for this result is as follows. First, suppose that there is no interregional tax competition, and a voting process for public goods provision exists within each region. Under this situation, all citizens except for the

median voter suffer from welfare loss as long as there is heterogeneity among citizens about preference for public goods. When regions are formed endogenously with this foresight, the number of regions in equilibrium is excessively large. Once tax competition is introduced among the formed regions, however, the downward pressure on the tax rates in equilibrium from the tax competition works to bridge the gap between the preferences of the median voter and other citizens. Therefore, the number of endogenously formed regions decreases, and the welfare of citizens improves as a result.

Kessler et al. (2002) investigated how integration of both capital and labor markets, which is financed by taxing capital and determined by direct voting, affects redistributive policy. The key feature of this study is the introduction of labor market integration, which makes it possible to explore the effects of labor inflow. This implies that the variance of preference distribution for public goods could diverge within a region. When we suppose that either the capital market or the labor market is integrated, the level of redistributive policy in equilibrium is excessively lowered, as expected. On the other hand, when the labor market is assumed to be partially integrated with a fully integrated capital market, the level of redistributive policy improves the welfare of the majority of citizens within each region, compared to the case of full integration of either the capital market or the labor market. An intuitive explanation for this result is as follows. If the capital tax rate of a region is lowered, capital flows into that region from other regions, and this increases labor wages and social transfers within that region. Due to the increased labor wages and social transfers, labor from other regions also flows into the region. This additional increment in labor, or citizens in the region, changes the shape of the preference distribution and relocates the median voter to a point distant from the median of the distribution. In other words, with inflowing labor, the median voter stops being the decisive voter. Hence, the median voter has an incentive to not set too low a tax rate so as to evade the change. Particularly, in the case of symmetric equilibrium, the median voters in both countries have this kind of upward incentive on tax rates, and it improves social welfare as a whole.

Policies determined through voting are not limited to the tax rate or amount of public goods. Tax structure can be a subject for determination through voting by citizens. Borck (2003) explored the choice of tax structure with a majority voting model in an economy with tax competition. The choice is binary, between imposing tax on mobile capital or on immobile labor. His findings indicated that taxing capital is chosen through the political process, even if taxing labor, which produces no distortions and is efficient as a whole for the economy, is available. This is because the median voter of the distribution of capital endowment becomes a net capital importer, and he/she has an incentive to control the price of capital in the market. In order to achieve this, the median voter chooses a tax structure that imposes tax on capital.

2.2.3 Lobbying Models

In models of strategic delegation under representative democracy, policymakers elected through citizens ' voting are affected by nothing but preferences of themselves. In other words, by taking account of candidates' preferences, citizens can change implemented policy only through voting in an election. Voting behavior is supposed to be the only way to affect policymaking in these kinds of models, which is, of course, the same as in direct voting models. However, in reality, the political process is not as clean and simple. There exist many kinds of special interest groups that pressurize policymakers in many ways besides voting, in order to make policymakers favor their groups while making policies. This rent-seeking behavior by special interest groups in politics is, what we call, lobbying. Lobbying has been one of main subjects in the literature on public choice and that of other fields associated with public policies. Thus, lobbying is by no means limited to the literature on tax competition.

Lorz (1998) explored the effect of tax competition, which arises from interregional capital mobility, on lobbying activities by special interest groups and on redistributive capital taxation. Heterogeneity in capital endowment among households contributes to differences in the most preferable tax rate and amount of redistribution for each household. A political conflict over the redistributive tax policy and the incentive to lobby arise from this heterogeneity. Once their regions are involved in tax competition, however, the function of the redistributive policy of each regional government is restricted by a considerable extent. This restriction by tax competition reduces incentives for lobbying for redistributive policy. As a result, tax competition has a beneficial function in that improves the level of social welfare, because lobbying activities are basically wasteful and give rise to distortions in economies.

Following this thread, Sato (2003) analyzed the balance of costs from economic distortion of interregional tax competition and political distortion of intraregional lobbying activities by citizen groups. In his capital tax competition model, each citizen group can assign more weight on their welfare in the objective functions of their regions through wasteful political activities. Interregional tax competition shrinks the size of government revenue that finances redistributive policy within each region and suppresses incentives for lobbying. Hence, distortion from wasteful lobbying activities is shrunk by the existence of capital mobility and tax competition. On the other hand, when the intensity of tax competition is sufficiently high, this beneficial aspect of tax competition is overwhelmed. Therefore, from the viewpoint of social welfare evaluation, it should be based on the balance of costs from economic distortion of tax competition and political distortion of lobbying activities.

Unlike the rent-seeking models dealing with redistributive tax policy, Lorz (2001) investigated the effects of capital mobility on wasteful lobbying activities and on local policies for public infrastructure within each region. The main result showed that lobbying activities are practiced more vigorously with high capital mobility compared to cases of zero or less capital mobility. This model assumes heterogeneity among citizens regarding the endowed amount of immo-

bile production factor or land, and citizen interest groups compete for provision amounts of public infrastructure within their regions. Increments in capital mobility have two effects, the first being increment of rent from the immobile factor, land. The other effect is the shift of the tax burden to finance public infrastructure policy from mobile capital income to immobile land income. The special interest group composed of citizens with richly endowed land has an incentive to lobby for increasing public infrastructure, because they would benefit from the former effect, which overwhelms the latter effect. On the other hand, the citizen group with poorly endowed land has the opposite incentive, namely to decrease the amount of public infrastructure. Therefore, even if their political influences cancel each other out and provided the amount of public infrastructure in equilibrium remains unchanged from the case of zero capital mobility, the extent of lobbying by citizen groups is activated by interregional capital mobility, as the marginal benefit to lobby increases with capital mobility.

Lai (2010) focused on wasteful lobbying activities of capitalists and tax incidence in an economy with capital market integration. The key focus of this study is the shifting of tax incidence with the degree of capital market integration. This shift changes the direction of lobbying activities: When the regions are closed, namely, when the capital market is not integrated among the regions (capital is not mobile), the capitalists are the incidence of capital tax. Then, capitalists have an incentive to lobby in order to lower the tax rate. On the other hand, once the capital market is integrated, capital is mobile among regions, and the incidence of capital tax now shifts from the capitalists to labor, which is not mobile among regions. In this case, the capitalists lobby with the opposite incentives on capital tax rate and try to increase it. With this framework, Lai (2010) provided a theoretical hypothesis to support the empirical findings that the negative effect of capital mobility on tax rates is not significant or even that the capital tax rates increase with capital mobility, as shown by Dreher (2006).

Using a setting similar to that of Lai (2010), Lai (2014) explored asymmetric tax competition with lobbying activities by capitalists to explain why a relatively smaller region does not necessarily set a relatively lower tax rate, which is contrary to the predicted result in the literature on asymmetric tax competition with a standard setting. The intuition for this result is as follows. When source-based taxation is employed as a tax regime, capitalists prefer a higher tax rate and more public goods provision within their own regions, and they have an incentive to lobby for these. When this political effect from lobbying activities prevails over the efficiency effect of lowering the tax rate, the tax rate in the relatively smaller regions is set higher than that in the relatively larger regions. Additionally, the advantage of being a small region, which is regarded as a standard result of asymmetric tax competition with a standard setting, is also reversed; the average level of utility in the smaller region becomes lower than that in the larger region due to capital outflow with a high tax rate. However, when the scope of welfare is limited to capitalists (i.e., it excludes labor), it is higher in the smaller region than the larger region.

2.2.4 Tax Competition vs. Tax Coordination Models

Tax coordination is recognized as an effective detriment to the "race to the bottom" or inefficiently low tax rates and underprovision of public goods, which are the standard results of interregional tax competition. However, it is not necessarily a panacea for a bad race. The literature on public choice predicts that tax coordination might lead to cartelization among regional governments and benefit only policymakers, not citizens. From the viewpoint of citizens' welfare, therefore, as Brennan and Buchanan (1980) pointed out, tax competition has a beneficial function as a mechanism to check inter-governmental cartelization and selfish policymaking by politicians.

Edwards and Keen (1996) presented a pioneering work that unified these different arguments of tax competition and tax coordination by introducing "Leviathan" governments with the purpose of maximizing tax revenue into the ZMW model. When the objective function of the government depends on citizens' welfare and budget surplus, tax competition acts to decrease citizens' welfare through fiscal externality, on the one hand. It also has the effect of decreasing budget surplus, which is wasteful for the citizen, on the other hand. Hence, an inefficiently low tax rate is not necessarily set in equilibrium as a result.

Whether the welfare of citizens increases when the coordinated tax rate rises is unclear in the framework of Edwards and Keen (1996). However, Fuest (2000) focused on the effect of an increment in the coordinated tax rate on the welfare of citizens using a model in which the government consists of politicians and bureaucrats. Policies are determined by bargaining between the two, whose preferences are different from each other. The result is as follows. While an increment in the coordinated tax rate always expands the provision of local public goods, it increases the cost from political distortions due to inter-governmental cartelization. Additionally, its effect on the welfare of citizens depends on the balance of bargaining power between the politicians and bureaucrats. However, it is clear that the increment always worsens citizens' welfare when the bargaining power of the bureaucrats dominates that of the politicians, who are representatives of citizens through elections. On the other hand, the increment in the coordinated tax rate benefits the politicians, bureaucrats, and special interest groups.

Eggert (2001) endogenized supplies of production factors, namely labor and capital, in the model of Edwards and Keen (1996). The main results are twofold. First, when both wage tax and source based capital tax exist, the effect of tax coordination on citizens' welfare is ambiguous. Second, when residence-based capital tax exists in the set of available tax instruments, tax coordination does not benefit either citizens or governments. The latter means that tax competition benefits the citizens, and decentralization is favorable for social welfare even if the amount of wasteful consumption by governments is substantial.

Fuest and Huber (2001) introduced a policymaking system for tax rates and amount of public goods provision through voting by citizens who are heterogenous about labor and capital income into a model in which tax competition and

tax coordination exist simultaneously. They examined the effect of tax coordination on social welfare among regions. In this model, economic distortion is defined as the marginal excessive burden of labor income tax, while political distortion is captured by the excessive provision of public goods caused by the median voters' relative position in the distribution of heterogeneity among citizens. Based on the balance between these two distortions, they investigated whether tax coordination benefits citizens living in regions under tax competition. They found that public expenditure should be financed without any distortions, which means that immobile capital should be taxed in an unintegrated capital market. Once the capital market is integrated among regions and interregional tax competition arises, however, its financial resource shifts from capital tax to labor income tax. Under this situation, citizens decrease their labor supply, and the amount of public goods provision also decreases due to the financial resource loss. This is the economic distortion from tax competition in the model. On the other hand, the political distortion is determined by skewness of income distribution within regions: Where the distribution is positively skewed, as observed in the real world, the median voters get lower income than the mean voter. They have an incentive to set a high tax rate and provide an excessively large amount of public goods when the tax rate is determined under tax coordination through voting, because their burden for the provision is also lower than the average. Additionally, this political distortion becomes larger with increasing skewness. Balancing these economic and political distortions substantially lowers the elasticity of labor supply with respect to labor income tax, indicating that the financial resource of public expenditure is not likely to be lost so easily. However, this effect is overwhelmed by the effect of excessive public expenditure due to political distortion by the median voters, and thus, tax coordination has negative effects on social welfare as a whole.

While the above-mentioned studies analyzed the assumptions that regional governments and their citizens always agree to the policy of tax coordination among regions and that coordinated tax rate is the only element to be determined, Grazzini and Ypersele (2003) examined the feasibility of the tax coordination policy between two countries asymmetric in their capital-labor endowment using the majority voting model. Where capital tax rates in each region are uncooperatively determined through voting by citizens living in regions under tax competition, production factors are allocated inefficiently in the equilibrium. Besides, they found that a tax coordination policy setting a minimum capital tax rate cannot be introduced, because the coordinated tax rate does not always improve the welfare of the median voters in each region due to asymmetry in their capital-labor endowment.

2.2.5 Leviathan Models

Even without the tax coordination factor, Edwards and Keen's (1996) study is pioneering from the viewpoint that they incorporated tax revenue-maximizing governments into the literature on tax competition. In this model, governments are assumed to be benevolent, their purpose being to maximize the social welfare

of their regions. They pointed out the possibility that tax competition, which depends on the objective functions of governments, does not necessarily lead to the "race to the bottom." Hence, the Leviathan model establishes one strand of studies in the literature.

Extending the model of Edwards and Keen (1996), Hange and Wellisch (1998) and Arikan (2004) examined the relation between citizens' welfare and number of regions. When the number of regions involved in tax competition increases, the intensity of competition also increases. Capital tax rates and budget surplus in the public sector are lowered, on the one hand, but the amount of local public goods provision is increased, on the other hand. As a result, the inefficient factor from the rent-seeking behavior of governmental bureaucrats is suppressed, and the welfare of citizens improves as the number of regions increases.

Thus, Brenann and Buchanann (1980) predicted that capital mobility and its downward pressure on the capital tax rate due to capital market integration would tame the Leviathan and benefit citizens' welfare. However, Köthenbürger (2005) showed that when each regional government is characterized as a Leviathan and federal equalizing transfer exists, this prediction is reversed. Under fiscal transfer, a certain portion of the differences among the average tax revenues of entire regions and the tax revenue of each region is given to a region as a subsidy from the central government, and the effect of increasing the tax revenue by increasing the capital tax rate is reduced by a cutback in the subsidy. As a result, all regional governments have an incentive to collude among themselves and pursue the central subsidy by increasing their average tax revenues. Additionally, Köthenbürger (2005) showed that the effect of this collusion is strong when the number of regions is small and the effect of increased tax revenue in each region, on average, is large enough.

Recently, Pal and Sharma (2013) endogenized objective functions of regional governments involved in tax competition. When the ultimate goal of the regional government is maximizing regional welfare, they can suppress the "race to the bottom" of the tax competition by changing their objective functions from welfare maximization to tax revenue maximization. Besides, the choice of tax revenue maximization is the dominant strategy irrespective of the region's orientation toward welfare or tax maximization. The economic distortion of tax competition can be limited with tax revenue maximization behavior.

2.3 Review of Ihori and Yang (2009)

We reviewed the literature on tax competition with political economy approaches in Section 2 by classifying the studies into five categories. In this section, we review a specific study in some detail, in order to examine how globalization affects politics in various countries practicing representative democracy.

The studies in the following chapters are regarded as extensions of Ihori and Yang's (2009) model. They incorporated the citizen-candidate model as did Osborne and Slivinski (1996) and Besley and Coate (1997), and a two-

stage game consisting of political competition and tax competition as did Besley and Coate (2003), into the canonical model of tax competition. With this model, they showed that an efficient level of local public goods can be provided even under an environment of interregional tax competition. This framework is tractable and applicable enough to be extended to an asymmetric situation. Hence, Ihori and Yang's (2009) model forms the core of this dissertation paper and is reviewed below in more detail.

However, many studies, including ours, focus on aspects different from those of Ihori and Yang (2009); while the latter were concerned about the efficiency of local public goods, this chapter focuses on the entity selected as the policymaker in each region, the location of the median voter in the distribution of capital endowment, and the manner in which we may connect the election result and relative characteristics of each region. Therefore, this review is done within the above-mentioned scope.

From the viewpoint of the election result, a citizen whose capital endowment is lower than that of the median citizen in the distribution is elected as the policymaker in every region. The intuition for this result is given as follows. Every citizen votes for a candidate to maximize their utilities via the policy implemented by the candidate, considering the result of tax competition, which is known to cause inefficiently low levels of capital tax rate and local public goods provision. Given this knowledge, all citizens can predict that the tax rate in equilibrium would be too low from the viewpoint of their capital endowment should one of them become a policymaker in their own region. Thus, they have an incentive to vote for a citizen with a stronger preference for local public goods. Hence, the median citizen, acting as the decisive voter in the election, chooses a citizen with a lower capital endowment than himself/herself.

Let us confirm this hypothesis with Ihori and Yang's (2009) model.

2.3.1 Economy

The basic setup of the economy in their model is as follows: There are $n > 1$ identical countries. N individuals live in a country. The capital endowed by each individual is perfectly mobile among countries, while labor is immobile. Individual j in country i supplies $\alpha \equiv 1/N$ units of labor and $\bar{k}_{ij}$ units of capital. The distribution of capital endowment is positively skewed as in the real world. Firms in all countries produce a single private good using labor and capital with the production function $f(k_i)$, where k_i is the amount of capital employed in country i. It is assumed that $f''(k_i) < 0 < f'(k_i)$, where a unit of the labor input is suppressed in this expression. The preference of individual j in country i defined as the quasi-linear function $u_{ij} \equiv c_{ij} + v(g_i)$ with $v''(g_i) < 0 < v'(g_i)$, where c_{ij} is consumption of private goods and g_i is that of public goods. Individuals consume private goods from wages and returns to capital investment, which implies $c_{ij} = \alpha[f(k_i) - (r + t_i)k_i] + r\bar{k}_{ij}$, where r is price of capital in the market. The government in country i levies tax on capital employed in the region, and provides local public goods with the tax revenue,

which implies $g_i = T_i k_i$[1].

When we define the total amount of initially endowed capital in country i as $\bar{k}_i$, $\bar{k}_i = \sum_j \bar{k}_{ij}$ holds. Then, the clearing condition of the capital market requires

$$\sum_i k_i = \sum_i \bar{k}_i. \tag{2.1}$$

With profit-maximizing behavior of firms, perfect mobility of capital implies

$$f'(k_i) - T_i = r(T_1, ..., T_n) \qquad \forall i. \tag{2.2}$$

Using (2.1) and (2.2), we have

$$\frac{\partial r}{\partial t_i} = \frac{-1}{n} < 0 \qquad \forall i \tag{2.3}$$

$$\frac{\partial k_i}{\partial t_i} = \frac{1 - (1/n)}{f''(k_i)} < 0 \qquad \forall i \tag{2.4}$$

$$\frac{\partial k_i}{\partial t_{-i}} = \frac{-(1/n)}{f''(k_i)} > 0 \qquad \forall i, -i, \tag{2.5}$$

where $-i$ is any country other than i.

2.3.2 Political Competition and Tax Policy

As mentioned above, Ihori and Yang (2009) constructed this model in the same manner as Osborne and Slivinski (1996), Besley and Coate (1997), and Besley and Coate (2003), namely as a two-stage citizen-candidate model. In the first stage, each country holds an election to select a policymaker from among its citizens. The elected policymakers in each country simultaneously decide their respective capital tax rates in the second stage.

To derive the subgame perfect Nash equilibrium, this game is solved backward.

Second Stage: Tax Competition

Suppose that in the election of country i, citizen j is elected as a policymaker, and he/she owns $\bar{k}_{ij}$ units of capital or, equivalently, a share s_{ij} of capital such that $s_{ij} = \bar{k}_{ij}/\bar{k}_i$. Taking $T_1, ..., T_{i-1}, T_{i+1}, ..., T_n$ as a given, the policymaker chooses tax policy T_i satisfying

$$T_i(s_{ij}) = \arg\max_{T_i} \{c_{ij} + v(g_i)\} \qquad \forall i. \tag{2.6}$$

The first-order conditions for this program are

[1] Functions with a prime denote first-order differentiation of the functions. Similarly, functions with double prime denote second-order differentiation of the functions. This is a consistent manner of notation through this dissertation paper

$$\frac{\partial u_{ij}}{\partial T_i} = \frac{\partial c_{ij}}{\partial T_i} + v'(g_i)\frac{\partial g_i}{\partial T_i} = 0 \qquad \forall i. \tag{2.7}$$

We assume that $\partial^2 u_{ij}/\partial T_i^2 < 0$, so that the second-order conditions are satisfied, and a unique $T_i(s_{ij})$ satisfying (2.6) surely exists.

First Stage: Political Competition

In this stage, an election is held in each country to select a policymaker from among the citizens through simple majority voting. We have two questions here: 1) who is the decisive voter in the election, and 2) who is the policymaker in the equilibrium of this game. While the latter question is our main concern, the former is not. By omitting the precise derivation process for the decisive voter, we concentrate our attention on the latter one. However, it is important to note the result of the former derivation process, namely that the decisive voter in this election is the median voter in the capital endowment distribution; thus, the well-known median voter theorem holds in this model. Hence, we can rephrase the latter question as "who does the median voter in the election vote for?"

As Persson and Tabellini (1992) pointed out, the median voter does not have the incentive to vote for himself/herself in the election. This is because while policymakers have to evaluate tax policy after elections, voters can evaluate it before the elections; there is an opportunity to gain higher utility by strategically delegating the right to set the tax rate of that country.

In other words, while the policymaker in country i has to take T_{-i} as a given when he/she makes a decision on T_i in the second stage, voters realize that the tax policy will be set according to (2.7). This implies that the tax rate preferred by the decisive median voter in region i satisfies

$$\frac{\partial u_{ij}}{\partial T_i} + \sum_{-i} \frac{\partial u_{ij}}{\partial T_{-i}} \frac{\partial T_{-i}}{\partial T_i} = 0 \qquad \forall i, \tag{2.8}$$

where u_{ij} is evaluated at the tax rate preferred by the decisive median voter, which is denoted as T_i^m. In order to realize the tax rate, the decisive median voter chooses a policymaker s_{ij}^p such that $T_i^m = T(s_{ij}^p)$. Evaluating (2.7) at $T_i(s_{ij}^p)$ and rewriting (2.8) accordingly, we derive

$$\bar{k}_{ij}^m - \bar{k}_{ij}^p = \sum_{-i} n \frac{\partial u_{ij}}{\partial T_{-i}} \frac{\partial T_{-i}}{\partial T_i} \qquad \forall i, \tag{2.9}$$

where $\bar{k}_{ij}^m = s_{ij}^m \bar{k}_i$ and $\bar{k}_{ij}^p = s_{ij}^p \bar{k}_i$ denote the capital shares of the median citizen and policymaker, respectively. Therefore, the sign of (2.9) indicates the location of the policymaker elected in the equilibrium of this game.

From (2.3)-(2.5), we have

$$\frac{\partial u_{ij}}{\partial T_{-i}} = \frac{1}{n}[\bar{k}_i(\theta - s_{ij}^m) - \frac{v'(g_i)T_i}{f''}] \qquad \forall i, -i, \tag{2.10}$$

where we use the property $k_i = \bar{k}_i$ in the symmetric Nash equilibrium. The second term is obviously negative. The first term is positive, because of the assumption that capital endowment distribution is positively skewed, or the median claim is always smaller than the mean claim; $s_{ij}^m < \alpha = 1/N$. Therefore, $\partial u_{ij}/\partial T_{-i} > 0$.

Hence, (2.9) is positive if and only if taxes are strategic complements (i.e., $\partial T_{-i}/\partial T_i$). This can be summarized by Lemma 2 of Ihori and Yang (2009) .

Lemma 2 of Ihori and Yang (2009).

The decisive median voter in each region will select a policymaker whose capital share is not higher than s_{ij}^m if and only if taxes are strategic complements.

Now, we arrive at the benchmark result for the studies reviewed in dissertation paper. As explained previously, the intuition behind this result is as follows. Given citizens' foresight regarding tax competition in the next stage (a foresight policymakers lack) and taking account of the prisoner's-dilemma-like result of the tax competition, the decisive median voter in each region has an incentive to strategically delegate the right to set a tax rate to a citizen whose preference is stronger than his/her own, such that the downward pressure on the tax rate is clearly canceled out by its upward pressure from the election result.

Chapter 3

Strategic Delegation in Asymmetric Tax Competition

This chapter 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. [1]

3.1 Introduction

Under representative democracy that is found in several Western countries and countries strongly affected by them, 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

[1] This chapter is based on Ogawa and Susa (2014).

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.[2]

Whereas we can date back to Persson and Tabellini (1992 and 1994) as a pioneer work in the literature on tax competition under representative democracy, only a few studies have been provided since then. Recently, however, Ihori and Yang (2009) incorporated the stylized form of representative democracy with citizen candidates into the canonical model of tax competition.[3] As a part of their findings in both of Persson and Tabellini (1992) and Ihori and Yang (2009), 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 chapter, we focus on examining who is selected as a policymaker in an *asymmetric* tax competition setting.[4] 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).

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 Ihori and Yang (2009) for the symmetric world.

Besides, there is one fact that we cannot explain with the assumption of the symmetric world; the typical former-jobs of diet members are quite different among countries around the world, for instance, lawyers and financial businessmen in the United States; local assembly members in Japan; teachers and professors in France; government employees in Germany; and businessmen in the United Kingdom (Sakakibara, 2011). It means that there is a diversity

[2]Although 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.

[3]Though 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.

[4]It is fair to mention that Ihori 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.

of policymaker-to-be's background among countries, which would be linked to social status and wealth. While this sort of diversity might come from differences in social institutions and conventions, we can give a theoretical hypothesis that explains this difference in policymakers' location in income distributions by connecting it with differences in other socioeconomic factors that characterize each country.

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 Ihori 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). Additionally, if we call the incentives of citizens to manipulate the terms of trade "terms-of-trade effect", two types of it can be shown to arise in this study: *inter*-terms-of-trade effect and *intra*-terms-of-trade effect. While the former is due to asymmetry between countries as explained above, the latter is caused by existence of distribution of capital share within each country. This means that, even if the two countries are symmetric in every factor including shapes of the distribution, *intra*-terms-of-trade effect arises, due to the fact that there is a heterogeneity of capital share among citizens.

Persson and Tabellini (1992) also provides an analysis of asymmetric tax competition as a part of their findings. They, however, develope a somewhat different tax competition model from ours.[5] 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; they call it "tax-the-foreigner effect". 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 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)

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

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 chapter 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 conclude.

3.2 The Model

The model constructed here follows that of Ihori 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.

The economy consists of two countries, $i = L, H$; 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.[6] We assume

[6]The 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

that $\Lambda = A_H - A_L > 0$, without loss of generality.[7] 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

$$r = f_k^i(k_i) - T_i, \tag{3.1}$$
$$2\bar{k} = k_H + k_L, \tag{3.2}$$

where r is the price of capital. Using (3.1) and (3.2), we have the amount of capital in country i and the price of capital as follows:

$$k_i = \bar{k} + \frac{A_i - A_{-i} - T_i + T_{-i}}{4}, \tag{3.3}$$
$$r = \frac{\Omega}{2} - 2\bar{k} - \frac{T_H + T_L}{2}, \tag{3.4}$$

where $\Omega \equiv A_H + A_L$. 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

$$c_{ij} = f^i(k_i) - f_k^i(k_i)k_i + r\theta_{ij}\bar{k} + g_i. \tag{3.5}$$

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

$$g_i = T_i k_i. \tag{3.6}$$

Using (3.1), (3.5), and (3.6), the utility function can be written as $u(c_{ij}) = f^i(k_i) + r[(\theta_{ij} - 1)\bar{k} + (\bar{k} - k_i)]$. 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

(2005), Itaya et al. (2008), and Kempf and Rota-Graziosi (2010), among others.

[7]The 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. Additionally, even though this productivity difference between regions is exogenously given here, we can interpret this not only as simply technological difference of firms, but also, in a broader sense, as difference in commercial practice between regions or in expenditure condition of public investment, which increases marginal productivity of capital that firms in the region employ. Hence, country $H(L)$ can not immidiately be associated with developed(developing) country.

Ypersele, 2005; Itaya et al., 2008; and Ogawa, 2013). In addition, this incentive captured by the second term with a bracket can be devided into two terms. The incentive expressed by the first term is interpreted as *intra*-terms-of-trade effect; this kind of incentive to manipulate the price of capital throught tax policy depends only on the relative position of individual in the distribution of capital endowment within a country, so that's why we add *intra*-. On the other hand, the incentive to manipulate price of capital in the market, captured by the second term in the bracket, is named *inter*-terms-of-trade effect; this incentive depends only on the relative position of country, capital-importing or -exporting country in sense of net, no matter the individual is relatively rich or poor with in his/her country. This classification of terms-of-trade effect will play a key role in the interpretation of the main result, presented later.

3.3 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.

3.3.1 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:

$$\begin{array}{ll} \max_{T_i} & u_{iP} = (A_i - k_i)k_i + r[(\theta_{iP} - 1)\bar{k} + (\bar{k} - k_i)], \\ \text{s.t.} & (3.3) \text{ and } (3.4). \end{array}$$

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

$$T_i(T_{-i}) = \frac{1}{3}T_{-i} + \frac{4\bar{k} - 4\bar{k}\theta_{iP} + A_i - A_{-i}}{3}. \tag{3.7}$$

Solving (3.7) for $i = L, H$, we obtain the tax rate of country i in the equilibrium of the following sub-game:

$$T_i = \frac{8\bar{k} - 6\bar{k}\theta_{iP} - 2\bar{k}\theta_{-iP} + A_i - A_{-i}}{4}. \tag{3.8}$$

Substituting (3.8) into (3.3)-(3.4), the equilibrium values are yielded as follows:

$$k_i = \bar{k} + \frac{2\bar{k}\theta_{iP} - 2\bar{k}\theta_{-iP} + A_i - A_{-i}}{8}, \tag{3.9}$$

$$r = \frac{\Omega}{2} + \bar{k}(\theta_{HP} + \theta_{LP} - 4) \tag{3.10}$$

3.3.2 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.

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 (3.7). 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.

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:

$$\begin{array}{ll} \max_{\theta_{iP}} & u_{iM} = (A_i - k_i)k_i + r[(\theta_{iM} - 1)\bar{k} + (\bar{k} - k_i)], \\ \text{s.t.} & (3.9) \text{ and } (3.10). \end{array}$$

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

$$\theta_{iP}(\theta_{-iP}) = \frac{1}{5}\theta_{-iP} + \frac{16\bar{k}\theta_{iM} - 8\bar{k} - A_i + A_{-i}}{10\bar{k}}. \tag{3.11}$$

From (3.11), 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:

$$\theta^*_{iP} = \frac{20\bar{k}\theta_{iM} + 4\bar{k}\theta_{-iM} - 12\bar{k} - A_i + A_{-i}}{12\bar{k}}. \tag{3.12}$$

The tax rate, the amount of capital, and the capital price in the equilibrium are respectively given as follows:[8]

$$T^*_i = \frac{4(3 - \theta_{-iM} - 2\theta_{iM})\bar{k} + (A_i - A_{-i})}{3}, \tag{3.13}$$

$$k^*_i = \bar{k} + \frac{(A_i - A_{-i}) + 4\bar{k}(\theta_{iM} - \theta_{-iM})}{12} \tag{3.14}$$

$$r^* = \frac{\Omega}{2} - 2\bar{k}(3 - \theta_{HM} - \theta_{LM}). \tag{3.15}$$

Before explaining the equilibrium outcome in detail, we make an assumption. In the strategic delegation game presented above, from (3.14), it is straightforward to verify that the following assumption guarantees nonnegative levels of capital.

Assumption 3.1. $-4(3 + \theta_{HM} - \theta_{LM}) < \Lambda/\bar{k} < 4(3 - \theta_{HM} + \theta_{LM})$

If Assumption 3.1 is violated, all capital flows to either of the two countries, and the other country becomes inactive.

3.4 Selected Policymaker

3.4.1 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 (3.12), the capital shares of the median voter and the policy-maker in each country can be compared as follows:

[8] As long as $\theta_{HM} = \theta_{LM} = \theta_M$, the tax rate of country H in the equilibrium is higer than that of country L. This is the same result with standard analysis of asymmetric tax competition: Bucovetski (1991), Pieretti and Zanaj (2011), and Pal and Sharma (2013).

$$\theta^*_{HP} - \theta_{HM} = (\theta_{HM} - 1) + \frac{\theta_{LM} - \theta_{HM}}{3} - \frac{\Lambda}{12\bar{k}}, \tag{3.16}$$

$$\theta^*_{LP} - \theta_{LM} = (\theta_{LM} - 1) + \frac{\theta_{HM} - \theta_{LM}}{3} + \frac{\Lambda}{12\bar{k}}. \tag{3.17}$$

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. Additionally, we assume that the shapes of the distributions, particularly, the locations of the medians, are symmetric; $\theta_{HM} = \theta_{LM} = \theta_M$. This is because we focus only the technological asymmetry for simplicity. Hence, the second terms of both (3.16) and (3.17) are canceled out.[9]

In (3.16) and (3.17), 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 $i = L, H$ when $\Lambda = 0$. This is also what Persson and Tabellini (1992) and Ihori and Yang (2009) point out in their setting of symmetric countries.

Meanwhile, the asymmetry of the countries denoted by $\Lambda(= A_H - A_L > 0)$ in this model influences the choice of policymaker by the median voter in each country, particularly in country L. The effects of regional asymmetry are summarized in the following propositions.

Proposition 3.1.
Assume that the income distribution is right-skewed, that is, $\theta_{iM} \in [0, 1)$. The decisive voter in country H delegates the power to set the tax rate to the poor.

Proof. From (3.16), $\theta^*_{HP} < \theta_{HM}$ for all $\theta_{iM} \in [0, 1)$.

Proposition 3.2.
Assume that the income distribution is right-skewed, that is, $\theta_{iM} \in [0, 1)$. The delegation in country L is characterized as follows.

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

[9] If the median voter of country H is located to the left of that of country L, country H becomes a more left-winged, or more redistributive, compared to country L. This implies that country H are likely to set a higher tax rate and becomes a capital-exporting country as explained later, due to the asymmetry of the distribution. Although the mechanism is quite different, the effect to result to elections is similar to it referred in the analysis of Persson and Tabellini (1992).

Delegation to the rich: When $\Lambda > 4\bar{k}(3-2\theta_{LM}-\theta_{HM})$*, 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 (3.17).

In country H, 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 L, 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 $\Lambda > 4\bar{k}(3-2\theta_{LM}-\theta_{HM})$, the median citizen as the decisive voter chooses a candidate whose capital share is higher than his/her own share.

Figure 3.1 is a graphical representation of our main results under Assumption 1, in which $\theta_M \equiv \theta_{LM} = \theta_{HM}$ is assumed in order to facilitate visualization. In the range of $\theta_{iM} \in [0,1)$, the decisive voter in country H always delegates the right to set the tax rate to the poor; in country L, however, it may be delegated to the rich if $\Lambda/\bar{k}$ is large.

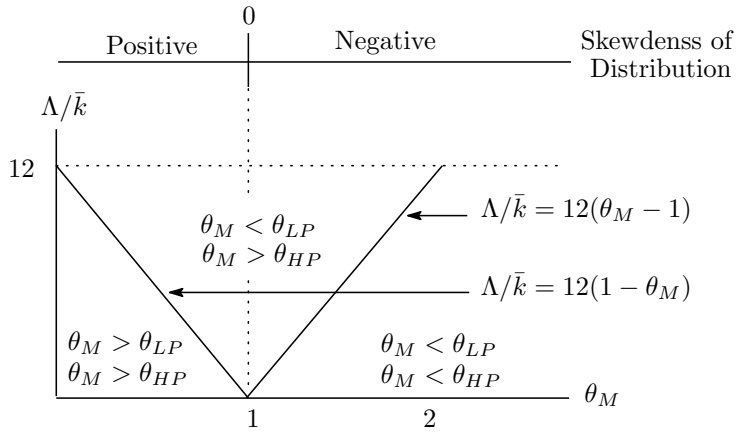

Figure 3.1. Equilibrium classification

Note. $\theta_{HM} = \theta_{LM} = \theta_M$ is assumed for simple visualization. $\Lambda/\bar{k} < 12$ under Assumption 3.1.

3.4.2 Mechanism

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, two types of terms-of-trade effect arises: *inter*-terms-of-trade effect and *intra*-terms-of-trade effect. The former effect works as

to make variation between countries in location of policymaker and the latter effect arises and works in the same direction as long as the distributions are skewed, even if the countries are symmetric. Hence, we can observe that both of *inter*- and *intra*-terms-of-trade effects work in the opposite direction to each other in country L. While they cancel out each other under certain condition, one dominates the other and policymaker in country L can be richer or poorer than the median voter, depending on the magnitude of *inter*- and *intra*-terms-of-trade effects.

To explain the intuition behind the variation from the case of two symmetric countries as presented by Persson and Tabellini (1992) and Ihori and Yang (2009), we start our explanation with $\Lambda = 0$. Figure 3.2 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_H^{med} and R_L^{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 3.2, we take the median voter's choice in country H as an example. Note that the median voter of country $H(L)$ gains higher utility as the indifference curve moves upward (to the right). The median voter in country H understands that given the median voter's choice in country L, R_L^{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_H, where R_L^{med} is tangential to $\bar{u}_H^{med}$. In Figure 2, R_H^{pol} represents the reaction curve of the individual who is chosen as the policy-maker in the first-stage election. Considering the negative monotonicity of T_i in θ_{ij}, the location of R_H^{med} and R_H^{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 as a capital importer in net can set a high tax rate, which leads to induce a low price of capital in the market. Even though the counties are perfectly symmetric in every factor, there is heterogeneity among citizens within a country; initially endowed capital share. Therefore, as long as the distributions of capital share are positively skewed in both countries and the skewednesses are symmetric, the median voters are capital importers in net. This can be easily confirmed with substituting $\bar{k}$ for k_i in the second term of the utility function $u(c_{ij}) = f^i(k_i) + r[(\theta_{ij} - 1)\bar{k} + (\bar{k} - k_i)]$.

The phenomenon that the median voter has the incentives to delegate to the poorer is also observed in symmetric case of Persson and Tabellini (1992) and Ihori and Yang (2009). The mechanism lying behind, however, is quite different from their studies. In the setting we assume here about utility function of citizens, there is no public goods and tax revenue is distributed to all citizens within a country in a lump-sum manner. While the reason why median voters

in both Persson and Tabellini (1992) and Ihori and Yang (2009) delegate to the poor is that they can foresee that tax rate in equilibrium will be excessively low one that could have been realized in the Prisoner's-dilemma-like equilibrium from the tax competition at the second stage, "tax-competition" effect doesn't exist in this model. However, two types of "terms-of-trade" effect do and the one works in even symmetric case is *intra*-terms-of-trade effect unless we assume normal distribution, or zero skewedness.

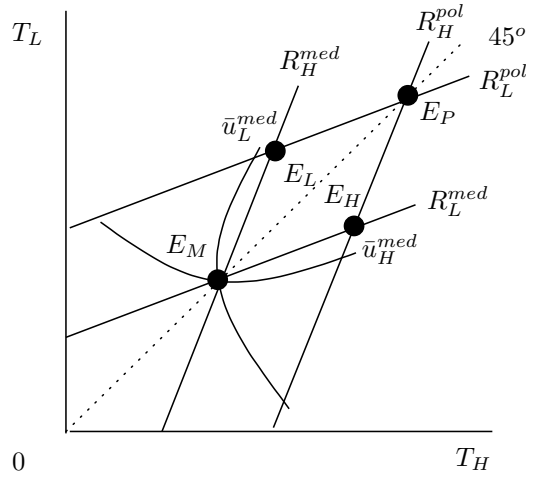

Figure 3.2. Reaction curves and indifference curves when $\Lambda = 0$.

As the median voter in country L acts in the same manner as the median voter in country H, 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.

The interdependency generated by capital market integration induces an incentive to control tax policy of other country through the political delegation in the former stage. As mentioned above, what the median voters want to do in this case is to lower capital price. To reach the goal, the median voter in a country need three steps: i) In order to lower capital price in the market, he/she needs tax rate of the other country to be increased. ii) In order to make tax rate of the other country be increased, he/she needs tax rate of his/her country to be increased. It is because, as well-known, tax competition have a character of strategic complement. iii) In order to make tax rate of his/her country increased, he/she needs to delegate the right to set a tax rate to a poor citizen. It is because the negative monotonicity between tax rate set by

policymaker and amount of capital endowment of policymaker holds. This is why the median voter in each country has an incentive to delegate to the poor in symmetric case.

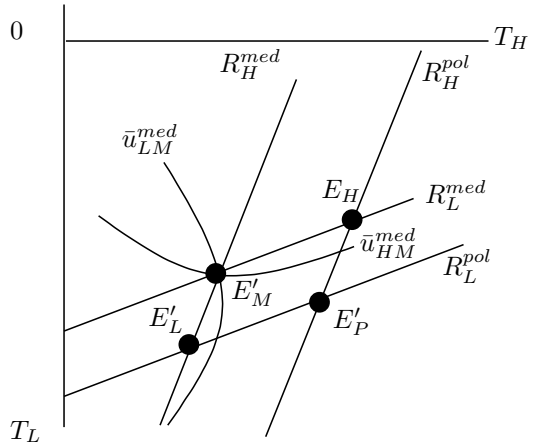

Figure 3.3. Reaction curves and indifference curves when $\Lambda > 12\bar{k}(1-\theta_M)$ and $\theta_{LM} = \theta_{HM} \equiv \theta_{iM} \in [0, 1)$.

From the above-mentioned ideas, the reason for the median voter in country H to delegate to a citizen whose capital share is lower than in a symmetric setting is quite straightforward. The key effect here, in turn, is *inter*-terms-of-trade effect: the effect arising from asymmetry between countries in canonical tax competition model setting without any heterogeneity among citizens.

For simplicity, and without loss of generality, assume $\theta_{HM} = \theta_{LM} = \theta_M$. In this case, country $H(L)$ imports (exports) capital; $\bar{k} - k_H^* = -\Lambda/12 < 0 < \bar{k} - k_L^* = \Lambda/12$. Under Assumption 1, the median voter in capital-importing country H is a net capital importer as well; $\theta_M\bar{k} - k_H = -12(1-\theta_M) - \Lambda/\bar{k} < 0$. The position of the median voter in country H 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 L, a tax increase in country H will reduce the price of capital (see (3.4)). This will reduce the cost of capital borrowing and benefit the median voter. From (3.13), 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 H 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_H^{med} and R_H^{pol} in Figure 3.3, where R_L^{med} is the tangential to $\bar{u}_{HM}^{med}$ at E_H.

In contrast, the median voter in country L turns out to be either a net capital importer or exporter on an individual basis, even though country L is a

capital-importing country as a whole. Notice that the following relation holds in the equilibrium.

$$\Lambda \underset{>}{\overset{<}{}} 12\bar{k}(1-\theta_M) \Leftrightarrow \theta_{LM}\bar{k} \underset{>}{\overset{<}{}} k_L^*. \tag{3.18}$$

(3.18) reveals that, when $\Lambda < 12\bar{k}(1-\theta_M)$, the median voter in country L behaves as if he/she were a net capital importer and has an incentive to reduce the capital price; whereas country L, 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 3.3 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_H^{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_L'. 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 3.3.

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; in other words, it depends on which effect dominates the other, between *intra-* and *inter*-terms-of-trade effect.

3.4.3 The Other Cases: Negatively Skewed Distribution

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 3.1n). This can be interpreted in a similar manner. When θ_{iM} is sufficiently large in both countries, the median voter in country H, as well as in country L, 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 (3.16) and (3.17), we can summarize the above argument as follows.

Proposition 3.3.

Assume that the income distribution is left-skewed, $1 \leq \theta_{iM}$. The decisive voter in country L 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 3.4.
Assume that the income distribution is left-skewed, $1 \leq \theta_{iM}$. The delegation in country H is characterized as follows.

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

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

3.5 Concluding Remarks

This chapter explored asymmetric two-country tax competition under representative democracy with citizen candidates. Under the symmetric setting, Persson and Tabellini (1992) and Ihori 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 Persson and Tabellini (1992) and Ihori 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.

Chapter 4

Strategic Delegation in Public Investment Competition

In this chapter, we analyze symmetric/asymmetric public investment competition under representative democracy, focusing on the characteristics of citizens elected through voting—specifically whether policymakers in each country are rich or poor. Whereas a citizen from the poor group is elected in symmetric capital tax competition according to previous works of Persson and Tabellini (Rev. Econ. Stud. 59:689-701, 1992) and Ihori and Yang (J. Urban Econ. 66:210-217, 2009), this analysis suggests a diametrically opposite result: a citizen from the rich group is elected in both countries in a sub-game perfect Nash equilibrium of two-stage citizen-candidate model. Only when regional asymmetry is sufficiently large is a citizen from the poor group elected in a capital-exporting country in equilibrium.

4.1 Introduction

The fiscal competition literature explores the behaviors of regional governments that compete for production factors through various policy instruments and examines the results of such competition. This strand of studies originated with the famous work of Oates (1972). Subsequently, Zodrow and Mieszkowski (1986) and Wilson (1986) provided mathematical refinements to the concepts. The fiscal competition literature developed rapidly along with the progress of globalization in the late 1980s and early 1990s.

Although most fiscal competition studies assume that regional governments are benevolent to their citizens and aim to maximize regional welfare, some studies try to shed light on the inner mechanisms of the government using a political economy approach. Persson and Tabellini (1992) is a pioneering work in fiscal

competition in the context of representative democracy. The authors incorporate representative democracy into the basic model and examine the functions of representative democracy as well as the characteristics of citizens elected as policymakers. Subsequently, Ihori and Yang (2009) demonstrated that local public goods are efficiently provided under certain conditions. Whereas both studies mainly focus on symmetric countries, Ogawa and Susa (2014) explore an asymmetric case and examine how regional heterogeneity affects asymmetric election results.

However, the common finding of Persson and Tabellini (1992) and Ihori and Yang (2009) is somewhat problematic. They show that poor citizens are elected as policymakers in each country or, to be precise, people choose a candidate whose capital share is lower than the median capital endowment in the country. Even in an asymmetric case explored by Ogawa and Susa (2014), the axis of the asymmetric election result is located at a point lower than the median value in the capital endowment distribution. As long as the countries are sufficiently asymmetric, a citizen located at a point higher than the median is chosen in one country but, contrary to our intuition, an extremely poor citizen is chosen in the other country. One would imagine that wealthy people become politicians precisely because they are wealthy and well educated, and enjoy a high social status right from the beginning.

Why do the rich become policymakers? In other words, why do people choose the rich as their policymakers? Do they not have a choice but to vote for the rich? Are the poor under some kind of social constraint against running in the elections? We know that such a constraint did exist in the past, in the history of democracy. At the beginning of democracy, or just a hundred years ago, the right to vote and to run in elections was limited to specific groups in each society around the world based on various factors such as sex, age, and wealth. In such an environment, the choice of policymakers was limited. However, times have changed. In developed countries under representative democracy, basically, people have the right to vote and to run in elections as long as they attain adulthood. In a representative democracy, it does not matter, nowadays, whether you are male or female, young or old, or rich or poor.

This means people need some incentive to choose the rich, and not the poor, as their policymakers. Although this seems natural, it is worth considering why people delegate the policymaking authority in their regions or countries to the rich. Besides, we need to examine the issue with an all-citizen-candidate model to exclude the possibility that the reason could be some kind of social constraint.

We change just one factor of the Ogawa and Susa (2014) model. The policy instrument to attract capital into their regions or countries is changed from the capital tax rate to the amount of public investment. A policymaker elected by citizens is delegated the authority to determine an amount of public investment to attract capital. As Keen and Marchand (1997) point out, regional governments can attract capital to their jurisdictions by not only lowering the capital tax rate, but also increasing public investments, because both of the policy instruments can help increase the returns on capital. Regional governments often try to attract capital investment from other jurisdictions or to stop capital

outflow from their jurisdictions by increasing the productivity of firms in their jurisdictions with public investments—by constructing roads, ports, airports, high-speed Internet networks, and so on. As the study of Bucovetsky (2005), public investment competition among regional governments has been analyzed as one strand of the literature of fiscal competition.[1]

In this analysis, the election results derived by Persson and Tabelliini (1992) and Ihori and Yang (2009) are totally reversed, with one difference: the rich become policymakers in both symmetric regions. The result is also reversed when we consider regional asymmetry, as the study in the last chapter did with capital tax competition. In country H, a country with relatively higher technology, the rich always become policymakers regardless of the degree of asymmetry. However, in country L, a country with relatively lower technology, we obtain three results: people choose i) the rich, ii) the median, and iii) the poor as their policymakers, depending on the degree of asymmetry.

The policy instrument shift from the capital tax rate to public investment induces three changes in the tax competition models. First, the policymakers play a *strategic substitute* game or, in the case of tax competition, a *strategic complement* game. Second, the price of capital in the market increases with public investment, but decreases with an increase in the capital tax rate. Third, the more capital the policymakers have, the more positive they are about public investment (because they receive higher returns from capital) and the less positive they are about an increase in the capital tax rate (because they do not want to redistribute their wealth to the poor). These three changes work as the key factors in reversing the election result in the case of capital tax competition.

The remainder of this paper is organized as follows. In section 2, we construct a model based on the previous chapter, with one modification. In section 3, the equilibrium of the game is derived. In section 4, we examine the location of policymakers in the capital endowment distribution and interpret the result. Finally, we conclude this analysis in section 5.

4.2 The Model

In this chapter, we constructed a two-stage citizen-candidate model following Ihori and Yang (2009).[2] In the first stage, an election is held to pick a citizen as policymaker for the country. In this election, every citizen has a right to vote, must be a candidate (there is no choice to be just a voter but not run in the election), and must accept the result. In the second stage, after the election,

[1] Several studies in the fiscal competition literature have examined interregional competition with capital tax and public input as public policies determined by governments (Matsumoto, 1998; Hindriks et al., 2008; Hauptmeier et al., 2012, among others). We focus only on the one of them. Kappeler et al. (2013) empirically point out the fact that fiscal decentralization, or globalization, foster local public investment, which can augment the productivity of regional firms.

[2] They build their model by following the citizen candidate-model of Osborne and Slivinski (1996) and Besley and Coate (1997). Particularly, a two-staged form of citizen-candidate model is proposed by Besley and Coate (2003).

the politicians in each country decide the regional policy, simultaneously. We examine the characteristics of policymakers—specifically whether they are rich or poor—in the sub-game perfect Nash equilibrium of this two-stage game and consider how we can connect the characteristics of politicians to the relative economic condition of the countries.

Our model is different from the models of Ihori and Yang (2009) and in the previous chapter as regards the policy instrument that the representatives of the country (i.e., the policymakers) choose. As the public policy instrument for the country, we replace tax on capital employed by firms with public investment in regional infrastructure to increase the productivity of firms. Productivity increment by public investment leads to an increase in the return on capital, as decrement in the capital tax rate does. This means regional policymakers can attract capital through public investment, which is financed from a lump-sum burden on each citizen of the country.

We assume two countries, $i = H, L$, whose population sizes are normalized as one. The individuals in each country are initially endowed with the same amount of labor, but the capital endowment is heterogeneous among individuals. The initial capital endowment in country i as a whole is denoted by $\bar{K}_i$ and the average amount of capital endowment is $\bar{K}_i/N_i$, which is defined as $\bar{k}_i$. The heterogeneity of capital endowment is captured by $\theta_{ij}(\geq 0)$. Individual j in country i is initially endowed with $\theta_{ij}\bar{k}_i$ units of capital, where θ_{ij} represents the ratio of the capital amount of individual j to the average endowment of country i. If individual j is located at the average of the capital endowment distribution, $\theta_{ij} = 1$. If he/she does not have any capital, $\theta_{ij} = 0$. Additionally, $\theta_{ij} < 1$ means individual j' stock of capital is less than the average, whereas $\theta_{ij} > 1$ means his/her stock of capital is more than the average. In most of the analysis here, the shape of the capital endowment distribution is assumed to be positively skewed as in the real world, so that θ_{ij} is always lower than one for an individual at the median of the distribution.

Firms produce private numeraire goods using labor and capital in a perfect competitive market in each country. They use constant-return-to-scale (CRS) technology, $F_i(K_i, N_i) = (A_i + G_i - (K_i/N_i))K_i$, where G_i denotes the amount of public investment by the regional government of country i.[3] We can rewrite this production function based on the per labor term as $f_i(k_i) = (A_i + G_i - k_i)k_i$, where k_i is the amount of capital employed by the firms in country i and A_i stands for a level of productive efficiency of firms as a country-specific parameter. This production function implies that the government of country i can increase the total productive efficiency of its firms by increasing public investment, even if the fundamental productive efficiency level A_i is given. We assume that the only asymmetry between the two countries concerns the level of technology. Without loss of generality, we assume that the technology level of country H is always higher than or equal to that of country L so that $A_H - A_L \equiv \Lambda \geq 0$.

[3]The quadratic form of the production function behaves perfectly, providing outcomes in an explicit form. This function has also been used in Bucovetsky (1991), Peralta and Van Ypersele (2005), Itaya et al. (2008), Kempf and Rota-Graziosi (2010), Ogawa (2013), and so forth.

On the other hand, any other economic factors are assumed to be symmetric between country H and L; $N_i = N$ and $\bar{K}_i = \bar{K}$. Besides, the population N is normalized as one, and the capital per capita in the economy is $2\bar{k}$.

As mentioned above, public investments by regional governments increase productivity of firms in their respective countries and, in turn, the net return on capital. The capital initially endowed to all citizens in this economy is perfectly mobile across the countries. These facts imply that

$$r = A_i + G_i - 2k_i, \tag{4.1}$$
$$2\bar{k} = k_H + k_L, \tag{4.2}$$

where r is net rate of return on capital, or the capital price in the market. With (4.1) and (4.2), we can derive the amount of capital and the price of capital in the market as follows:

$$k_i = \bar{k} + \frac{A_i - A_{-i} + G_i - G_{-i}}{4}, \tag{4.3}$$
$$r = \frac{\Omega}{2} - 2\bar{k} + \frac{G_H + G_L}{2}, \tag{4.4}$$

where $\Omega \equiv A_H + A_L$. We define the preference of individual j in country i as a linear function with respect to the consumption level of private goods, $u(c_{ij}) = c_{ij}$. Individuals consume private goods subject to the constraints of their income, consisting of labor income $w_i = f^i(k_i) - f^i_k(k_i)k_i = k_i^2$ and return from capital, which differs among citizens as captured by $r\theta_{ij}\bar{k}$. However, the cost of public investment in a country is borne by the citizens of that country as a lamp-sum burden. Regional governments build local infrastructure such as roads, ports, and public networks with the budget funds collected from their citizens. We assume that the cost function of public investment is defined as[4]

$$\Pi(G_i) = \frac{1}{4}G_i^2. \tag{4.5}$$

Hence, the utility function of individual j in country i is denoted as

$$u(c_{ij}) = k_i^2 + r\theta_{ij}\bar{k} - \frac{1}{4}G_i^2. \tag{4.6}$$

4.3 Equilibrium

In this chapter, we construct a two-stage model to describe a policy regime under representative democracy in a simple way. The timing and who-does-what in this two-stage game are defined as follows.

[4]The quadratic cost function for public input is used in Hindriks et al. (2008), Hauptmeier et al. (2012), and so on.

1. An election is held in each country to pick a citizen as policymaker. In this election, every citizen is a candidate and has a right to vote. The citizen who wins a majority becomes the policymaker in that country, and the authority to set a policy, that is, the amount of public investment, is delegated to him/her.

2. The policymaker decides the amount of public investment G_i in his/her country. We assume that the policymaker is so selfish that the individual pursues his/her own profit at the moment and is not concerned about the social welfare of the country as a whole, the elections that will take place in the future, or anything else.

Every decision in each step is made simultaneously and independently. We use the sub-game perfect Nash equilibrium concept in this game so that it is solved backwards.

4.3.1 Second Stage: Public Investment Competition

Suppose that the policymaker elected through majority voting in country i has $\theta_{iP}\bar{k}$ units of capital initially. Given the policy implemented in the opposite country, G_{-i}, the policymaker in country i determines an amount of public investment in his/her country so as to maximize his/her utility. He/she solves the maximization problem as follows:

$$\begin{aligned} \max_{G_i} \quad & u_{iP} = k_i^2 + r\theta_{iP}\bar{k} - \frac{1}{4}G_i^2, \\ \text{s.t.} \quad & (4.3) \text{ and } (4.4). \end{aligned}$$

From the first-order-condition, we have the reaction function of country i:

$$G_i(G_{-i}) = -\frac{1}{3}G_{-i} + \frac{A_i - A_{-i} + 4\bar{k}(1+\theta_{iP})}{3}. \tag{4.7}$$

Solving the simultaneous equation (4.7) for $i = H, L$, we obtain the amount of public investment of country i in the equilibrium of this sub-game as

$$G_i = \frac{A_i - A_{-i}}{2} + \frac{\bar{k}(2 + 3\theta_{iP} - \theta_{-iP})}{2}. \tag{4.8}$$

We derive the equilibrium values of capital employed in country i and the capital price in the market by substituting (4.8) into (4.3) and (4.4) as follows:

$$k_i = \frac{A_i - A_{-i}}{2} + \frac{\bar{k}(2 + \theta_{iP} - \theta_{-iP})}{2}, \tag{4.9}$$

$$r = \frac{\Omega}{2} - k + \frac{\bar{k}(\theta_{HP} + \theta_{LP})}{2}. \tag{4.10}$$

4.3.2 First Stage: Voting in the Election

An important feature of this model is that the political process of representative democracy is explicitly incorporated into a basic model of fiscal competition—specifically, interregional public investment competition. We open the black box of benevolent government, assumed in most fiscal competition studies, by identifying to whom the authority to decide public policy is delegated and by whom. In other words, assuming there exists a decisive voter in the election, we need to answer two questions at this stage: (i) Who is the decisive voter? (ii) Who becomes the policymaker through the election process in each country? We answer these questions in order.

Who Is the Decisive Voter?

The decisive voter of the election is the citizen located at the median of the country ' s capital endowment distribution. As is well known, the median voter theorem holds in this model. Let us verify this result.

The key point we need to first examine is whether the citizens' preferences regarding candidate characteristics are single-peaked, that is, the initial capital endowment is θ_{ij}. Although a direct proof for this is difficult to find, we can demonstrate it with two factors: the second-order condition and monotonicity. The second-order condition of policymakers' maximization problem $\partial^2 u_{iP}/\partial G_i^2 < 0$ exhibits single-peakedness over the amount of public investment G_i, which means that each citizen, as a policymaker candidate, has the most preferred amount of public investment. Besides, as we can observe from (7), there exists a monotonic tendency between the stock of capital endowment of policymakers and the public investment implemented by them; the more capital endowment they have, the more public investment they implement. The intuition is straightforward. If a policymaker is endowed with a large stock of capital initially, the person would have a stronger incentive to obtain high returns from capital than if he/she had little capital. Then, what he would do is increase the price of capital in the market by increasing public investment and, in turn, the productivity of firms. Therefore, simultaneously considering these two factors, the second-order condition and monotonicity, we can verify that citizens' preferences regarding the characteristics of candidates, θ_{ij}, are single-peaked.

This induced single-peaked preference regarding the capital share of candidates shows that the citizen located at the median of the capital endowment distribution is the Condorcet winner in this political process. Suppose a situation in which a citizen with $\theta_{ij}\bar{k}$ units of capital prefers a candidate with $\theta_{ij}^{'}\bar{k}$ units to another with $\theta_{ij}^{''}\bar{k}$ units, where $\theta_{ij}^{''} < \theta_{ij}^{'}$. In this case. citizens who have more than $\theta_{ij}\bar{k}$ units of capital must agree with the citizen with $\theta_{ij}\bar{k}$ units because candidate preferences are single-peaked. This implies that a citizen located at the median of the distribution can obtain the approval of the majority of that country and he/she is the Condorcet winner here.

Who Becomes the Policymaker?

As shown above, the median voter is the decisive voter in this election process. The next question is to whom the median voter delegates the authority to determine and implement public investment in that country. Given the political process in the other country, θ_{-iP}, suppose that the median vote in country i has $\theta_{iM}\bar{k}$ units of capital and confronts a utility maximization problem with respect to the amount of capital endowment of the policymaker, θ_{iP},:

$$\begin{array}{cc} \max_{\theta_{iP}} & u_{iM} = k_i^2 + r\theta_{iM}\bar{k} - \frac{1}{4}G_i^2, \\ \text{s.t.} & (4.8),\ (4.9)\ \text{and}\ (4.10). \end{array}$$

From the first-order-condition, we obtain the reaction function of the median voter in country i:

$$\theta_{iP}(\theta_{-iP}) = -\frac{1}{5}\theta_{-iP} + \frac{2\bar{k}(1+2\theta_{iM}) + A_i - A_{-i}}{5\bar{k}}. \tag{4.11}$$

Solving simultaneous equation (4.11), where $i = H, L$, we figure out that the policymaker selected by the median voter in the sub-game perfect Nash equilibrium of this game is characterized by capital endowment as follows:

$$\theta_{iP}^* = \frac{5\theta_{iM} - \theta_{-iM}}{6} + \frac{A_i - A_{-i}}{4\bar{k}} + \frac{1}{3}. \tag{4.12}$$

Additionally, the equilibrium values of capital employed, capital price, and public investment are respectively obtained as follows:

$$k_i^* = \bar{k} + \frac{3}{4}(A_i - A_{-i}) + \frac{\bar{k}}{2}(\theta_{iM} - \theta_{-iM}), \tag{4.13}$$

$$r^* = \frac{\Omega}{2} - \frac{2}{3}\bar{k} + \frac{\bar{k}}{3}(\theta_{HM} + \theta_{LM}), \tag{4.14}$$

$$G_i^* = \frac{4}{3}\bar{k} + A_i - A_{-i} + \frac{2}{3}\bar{k}(2\theta_{iM} - \theta_{-iM}). \tag{4.15}$$

To ensure that both countries are active, we need to make an assumption about the capital amount in each country:

Assumption 4.1 $-2(2 + \theta_{HM} - \theta_{LM})/3 < \Lambda/\bar{k} < 2(2 + \theta_{LM} - \theta_{HM})/3$

This assumption guarantees that the amount of capital employed in each country is nonnegative, so that the firms can surely produce private goods. A violation of this assumption implies that all capital flows out from one country into the other.

4.4 Policymaker in the Equilibrium

4.4.1 Where is the Policymaker in the Distribution?

In this analysis, we mainly focus on the location of the policymakers in the distribution of capital endowment. In other words, we need to answer the question whether the policymaker in each country is rich or poor, and why. To figure it out, we compare the policymakers' equilibrium capital shares with the median citizen's share as follows:

$$\theta^*_{HP} - \theta_{HM} = \frac{2 - \theta_{HM} - \theta_{LM}}{6} + \frac{\Lambda}{4\bar{k}}, \tag{4.16}$$

$$\theta^*_{LP} - \theta_{LM} = \frac{2 - \theta_{HM} - \theta_{LM}}{6} - \frac{\Lambda}{4\bar{k}}. \tag{4.17}$$

Most capital income distributions we observe in the real worlds are positively skewed; specifically, the capital share of the median citizen in a country is lower than the average share, or $\theta_{iM} \in [0, 1)$. Therefore, we begin the following analysis with the case $\theta_{iM} \in [0, 1)$; we will revert to this topic later to discuss the case where the distribution of capital endowment is negatively skewed.

Symmetric Case: $\Lambda = 0$

As a simple starting point, we first examine the case in which there is no technological asymmetry between the two countries, or when $\Lambda = 0$. In this case, the second term in both (4.16) and (4.17) is zero. Considering that the first term in both is positive as long as we assume $\theta_{iM} \in [0, 1)$, the right-hand side of (4.16) and (4.17) is always positive. This is summarized as follows.

Proposition 4.1.
Suppose that the distribution of capital endowment is positively skewed in each country, that is, $\theta_{iM} \in [0, 1)$. The decisive median voter delegates the authority to decide an amount of public investment in that country to the citizen whose capital share is always higher than his/her own share.

Proof. From (4.16) and (4.17), $\theta^*_{iP} > \theta_{iM}$ holds when $\Lambda = 0$ and $\theta_{iM} \in [0, 1)$.

This implies that a rich citizen is elected as a policymaker in that country. People living in countries under representative democracy might intuitively see this as an ordinary matter. Interestingly, however, fiscal competition studies in the context of representative democracy, such as Persson and Tabellini (1992), Ihori and Yang (2009), and the analysis in chapter 3, have not been able to explain the situation, although they show that the decisive voter in each country delegates the policymaking authority to the poor, a result diametrically opposite to this proposition. Obviously, for the purpose of this analysis, we do not set any constraint (monetary, educational, etc.) that bars the poor from running in elections; we apply the all-citizen-candidate model here. We only shift from

capital tax to public investment as the policy instrument to attract capital into each country. This analysis explains why people have a set picture in their mind about how rich policymakers would behave and, indeed, why they are rich in the first place.

Asymmetric Case: $\Lambda > 0$

Even though we could explain why citizens select policymakers from the rich group, defined as people whose capital share is higher than the capital at the median of the distribution, we are yet to find an answer to another question: Why is an extremely rich man picked as policymaker in one country and a barely rich man in another? For example, if we consider the previous jobs of members of the national assembly in each country, we would recognize a certain trend in its elections. In the United States or the United Kingdom, for example, former lawyers or financiers tend to be chosen as policymakers. However, in Germany or Japan, for example, people tend to choose former public servants of the central or local governments as policymakers. These are surely respected positions with stable income, higher than the average or median of the income distribution. The issue, however, is how far removed from the average or median are they? The prior positions in the former countries are usually perceived to command extremely high incomes, whereas the jobs mentioned for the latter countries yield just moderately high incomes. We try to explain this disparity by relating the election results to other economic factors that characterize each country.

The asymmetry between the two countries in this model is captured by technological asymmetry $\Lambda(= A_H - A_L > 0)$; the level of productive efficiency is always higher in country H than in country L. This asymmetry in the model influences the result of the political process, particularly the choice of the decisive median voter in each country. We can summarize the effects of regional asymmetry on the elections as follows.

Proposition 4.2.
Suppose the distribution of capital endowment is positively skewed, $\theta_{iM} \in [0, 1)$. The decisive median voter in country H delegates the authority to decide the amount of public investment to the rich, or a citizen whose capital sharer is higher than that of the median voter him-/herself. In addition, the larger the regional asymmetry is, the higher is the capital share of the policymaker.

Proof. See (4.16). $\theta^*_{HP} > 0$ holds when $\theta_{iM} \in [0, 1)$ and $\Lambda > 0$.

Proposition 4.3.
Suppose the distribution of capital endowment is positively skewed, $\theta_{iM} \in [0, 1)$. The delegation by the decisive median voter in country L is described as follows:

Delegation to the rich: When $\Lambda < 2\bar{k}(2-\theta_{HM}-\theta_{LM})/3$, the capital share of the policymaker chosen through the election is higher than that of

the median voter, which implies that the policymaker is elected from the rich.

Delegation to the median voter him-/herself: When $\Lambda = 2\bar{k}(2 - \theta_{HM} - \theta_{LM})/3$*, the decisive median voter chooses him-/herself in the election.*

Delegation to the poor: When $\Lambda > 2\bar{k}(2-\theta_{HM}-\theta_{LM})/3$*, the capital share of the policymkaer chosen through the election is lower than that of the median, which implies that the policymaker is elected from the poor.*

Proof. See (4.17).

In country H, the regional asymmetry Λ increases the gap between the capital share of the decisive median citizen and that of the citizen selected as a policymaker of the country. The greater the asymmetry, the more widely spread are the locations of the two in the capital share distribution. The policymaker is chosen from the richer group where the asymmetry between the region is large.

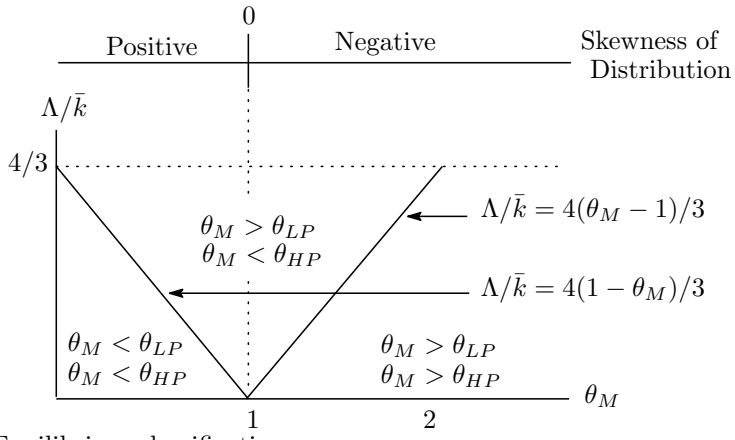

Figure 4.1. Equilibrium classification

Note. $\theta_{HM} = \theta_{LM} = \theta_M$ is assumed for simple visualization. $\Lambda/\bar{k} < 4/3$ under Assumption 4.1.

In country L, however, the gap between the capital shares of the decisive median citizen and of the citizen selected as a policymaker decreases when the regional asymmetry increases from zero to a certain degree. When the degree of regional asymmetry satisfies $\Lambda = 2\bar{k}(2 - \theta_{HM} - \theta_{LM})/3$, the gap vanishes, and the median citizen chooses him-/herself as a policymaker for the country. If the asymmetry exceeds this value, the gap increases with the asymmetry; the policymaker in country L is then picked from the poor group of that country.

Figure 1 shows the main result under Assumption 4.1, where we assume that the shapes of the distributions of capital endowment, particularly the location of the median citizens, are the same with each other, in order to simplify the visualization; $\theta_{HM} = \theta_{LM} = \theta_M$.

4.4.2 Mechanism

This section, explains the mechanism behind the choice of the median voter. This discussion focuses on two factors: the structural feature of the game under representative democracy and the terms-of-trade effect.

Voters can take advantage of this two-stage game structure; policymakers must determine the policy of their country ex post, that is, after the election, while voters determine the policymakers of their country ex ante, that is, before the election. In other words, voters in one country can foresee who reacts, and how, against a policymaker of the other country, whereas the policymakers of one country must decide their behavior given the strategy of the policymaker of the other country.

When the capital market is not integrated or when capital is immobile between countries, the best strategy for every citizen is to vote for himself/herself so that each one can choose a policy he/she wants. However, once the capital market is integrated, the public policy of each country becomes interdependent through the market. The public policy of a country affects its capital inflows (outflows) and the capital price in the market, implying that each citizen has an incentive to delegate the policymaking right to other citizens to influence the policymaking in the other country through the interdependency of public policy. Therefore, we can argue that the direction and magnitude of the gap between the median voter and the policymaker in equilibrium are affected by the incentive to influence policymaking in the other country to obtain higher utility than if the market were not integrated.

Now, how can the median voters obtain higher utility in this framework? Citizens, particularly the median voters in each country, have an incentive to control the capital price in the market. The direction of change they want (i.e., whether the price should be higher or lower) depends on whether they are net capital exporters or importers. Moreover, as pointed out in chapter 3, two terms-of-trade effects arise in this model: *inter*-terms-of-trade and *intra*-terms-of-trade effects. The former is caused by the asymmetry between countries, as shown in the standard analysis in the asymmetric fiscal competition literature. According to the asymmetric factor, countries are divided into net capital-importing and capital-exporting countries. On the other hand, the latter effect is caused by capital endowment heterogeneity among citizens in a country. This means every citizen has different incentives to control the price of capital as long as the heterogeneity exists. Therefore, even where the countries are symmetric, the *intra*-terms-of-trade effect appears. These two effects work in the same direction in some cases and in the opposite direction in other cases. The two effects work in the same direction in country H and in the opposite direction in country L has three patterns as mentioned in Proposition 4.3. The result depends on which effect dominates.

On the premise that these two effects act as key factors, we proceed to the details of the mechanism behind the results. The symmetric case is addressed first, followed by the asymmetric case.

Symmetric Case: $\Lambda = 0$

We start with the case where the two countries are symmetric, that is, $\Lambda = 0$. This means we focus only on the *intra*-terms-of-trade effect here, leaving the *inter*-terms-of-trade effect for a while. Figure 2 shows the indifference curves and reaction functions of the decisive median voters of both countries, as well as the reaction function of the policymakers, when $\Lambda = 0$ and the distributions of capital endowment are symmetric and positively skewed, $\theta_{HM} = \theta_{LM} = \theta \in [0, 1)$. R_i^{med} depicts the reaction function of the median voter in country i if the median voter chooses him-/herself as a policymaker of the country; R_i^{pol} depicts the reaction function of the policymaker in country i, if the median voter delegates the authority to determine public policy to other citizens; $\bar{u}_i^{med}$ is the indifference curve of the median voter in country i.

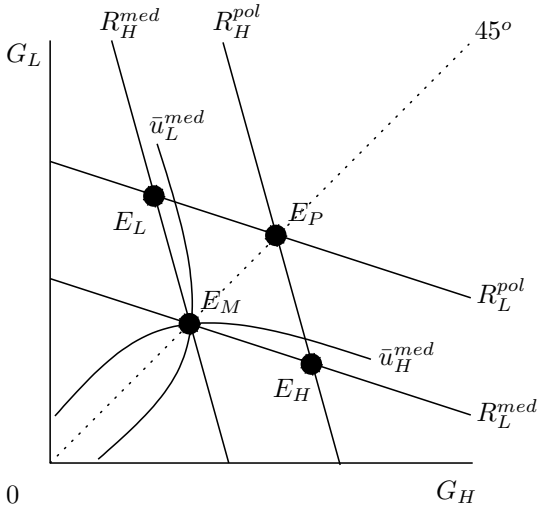

Figure 4.2. Reaction functions and indifference curves when $\Lambda = 0$.

Suppose that the median voter chooses him-/herself as a policymaker in each country. In this case, the equilibrium public investment is represented by point E_M. Do the median voters have any incentives to deviate from the equilibrium? The answer is YES. In this two-stage game, the players, that is, the decisive median voters, are able to foresee who would do what in the second stage if each one of the citizens is chosen as a policymaker. In other words, when the median voter chooses a policymaker of his/her country, he/she can recognize the reaction functions of all citizens in the country and pick one of them so as to maximize his/her utility, given the reaction function of the other country. Let us take the median voter of country H, for instance. He/she can gain a higher utility when the indifference curve moves downward, so he/she tries to find a way to take the equilibrium to a point under $\bar{u}_H^{med}$, such as

point E_H, with a given reaction function chosen in country L. As shown in Figure 2, the way to achieve this is to delegate the authority to determine the amount of public investment to a citizen who is likely to provide more public investment than the median voter would do. A citizen who tends to do so would be richer than the median voter himself/herself because the amount of public investment provided monotonically increases with the capital endowment as mentioned above. Therefore, the median voter of country H has an incentive to delegate the authority to decide public policy in his/her country to the rich. Besides, delegating to the rich is his/her dominant strategy as long as the citizen can gain a higher utility when the indifference curve moves downward and the reaction function chosen in country L is downward sloping.

By this delegation, the median voter, as a net capital importer, can set a lower price of capital. We can understand this in three steps i) When the median voter of country H delegates the right to the rich, public investment in country H increases. ii) When public investment in country H increases, public investment in country L decreases, because public investment competition is a strategic substitute game. iii) When the amount of public investment in country L decreases, the price of capital in the market is lowered because it decreases the net return of capital in production.

We understand why the reduced capital price provides higher utility to the median voter, who is a net capital importer, when we rewrite the utility function $u(c_{ij}) = k_{ij}^2 + r\theta_{ij}\bar{k} - G_i^2/4$ as $u(c_{ij}) = f_i(k_i) + r(\theta_{ij}\bar{k} - k_i) - G_i^2/4$ substituting $\bar{k}$ for k_i. The latter utility function means the income of citizen j in country i is composed of GDP, income/expenditure from the net import/export of capital, and the cost of public investment. Therefore, as long as the distribution of capital endowment is positively skewed, that is, $\theta_{iM} < 1$, the median voter can obtain a higher utility from the reduced capital price. Despite no asymmetry between the countries, they have an incentive to control the price of capital because of the heterogeneity among citizens. This is what we call the *intra*-terms-of-trade effect.

The exactly same explanation applies to the median voter of country L. However, note that the median voter of country L gains a higher utility as the indifference curve $\bar{u}_L^{med}$ moves to the left in Figure 2.

Asymmetric Case: $\Lambda > 0$

In order to simplify the interpretation, we assume that the capital endowment distributions of both countries are characterized by zero skewness, $\theta_{HM} = \theta_{LM} = 1$, which implies that the mean and the median are located at the same point of the distribution. With this assumption, (4.16) and (4.17) show that while the median voter in country H chooses a citizen whose capital share is higher than his/her own share, the median voter in country L chooses a citizen whose capital share is lower than his/hers. In addition, from (4.13) with the same assumption, $-3\Lambda/4 < k_L^* - \bar{k} < 0 < k_H^* - \bar{k} = 3\Lambda/4$, which implies country H is a net capital-importing and country L a net capital-exporting country. Figure 3 captures the delegation of authority by the median voter in

each country, as expressed in (4.16) and (4.17). A significant difference from Figure 2 is the shape of the indifference curve for country L: the median voter in country L gains a higher utility when the indifference curve moves to the right in Figure 3 but to the left in Figure 2.

Except for this point, the mechanism behind the result is interpreted in the same manner as in the symmetric case above; the median voters in each country, being aware of all the reaction functions of each one of the citizens, are able to determine whom they should choose as policymaker for their country. If the median voters of both countries decide to delegate to none but him-/herself, the equilibrium is depicted by $E_M^{'}$. In this case, the median voter of country H can gain a higher utility by delegating authority to a citizen who is likely to provide more public investment than he/she would do. This means the decisive median voter has an incentive to choose a rich citizen. In country L, however, the median voter can gain a higher level of utility by delegating authority to a citizen who is likely to provide less public investment than he/she would do. This implies that the decisive median voter has an incentive to choose a poor citizen.

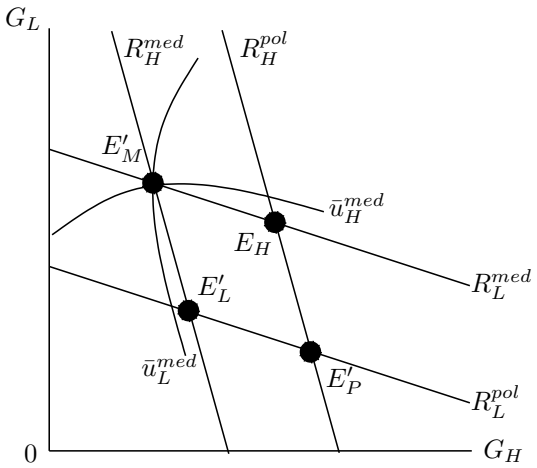

Figure 4.3. Reaction functions and indifference curves when $\Lambda > 0$.

As mentioned above, the only difference between the two countries is the level of technology, which is captured by Λ. This difference identifies H as a net capital-importing and L as a net capital-exporting country. Therefore, the effect that leads to the asymmetric election result is defined as the *intra*-terms-of-trade effect.

The reason that the median voter in country L, a net capital exporter, can obtain a higher utility by delegating to the poor is also understood in three steps: i) When the median voter in country L delegates the right to the poor, public investment decreases in country L. ii) When public investment decreases in country L, it increases in country H, because public investment competition is a

strategic substitute game. iii) When public investment in country H increases, the price of capital in the market is heightened. Then, the median voter in country L exports his capital for a higher price and obtains a higher income.

The two effects, *inter*- and *intra*-terms-of-trade effects, are clearly captured by the first term and the second term, respectively, of (4.16) and (4.17). In addition, when we rewrite the utility function as $u(c_{ij}) = f_i(k_i) + r[(\theta_{ij} - 1)\bar{k} + (\bar{k} - k_i)] - G_i^2/4$, the terms-of-trade effect can be easily separated as the two terms in the bracket; the former is due to the heterogeneity of citizens, and the latter to the asymmetry of the countries. These two effects work in the same direction in country H, but in the opposite direction in country L. When the *intra*-terms-of-trade effect dominates the inter-terms-of-trade effect, a citizen with less capital endowment than the median is elected as a policymaker. Apart from this case, policymaker are basically chosen from the rich group in each country.

4.4.3 The Other Cases: Negatively Skewed Distribution

So far, we have assumed that the distribution of capital endowment in each country is positively skewed as in the real world, that is, $\theta_{iM} \leq 1$. In this subsection, we refer to negatively skewed distributions (i.e., $\theta_{iM} > 1$). Even though hardly observed, such cases are worth investigating for an in-depth understanding of the mechanism of this model. As shown in Figure 1, the poor are elected as policymakers in both countries under certain conditions. The interpretation of results is the same for both positively and negatively skewed distributions, although the *inter*-terms-of-trade effect works in the opposite direction. This is because the median is lower than the average in the positively skewed and higher in the negatively skewed distribution. With no asymmetry between the two countries, this reversion turns the median voter, who has an incentive to raise the price of capital in the market, into a net capital exporter. Therefore, he/she delegates the authority to decide public investment to a citizen whose capital share is lower than the median. The choice of candidate shifts to the opposite direction of the median voter with a positively skewed distribution. From (4.16) and (4.17), this argument can be summarized as follows.

Proposition 4.4.
Suppose the distribution of capital endowment is negatively skewed, $\theta_{iM} > 1$. The decisive median voter in country L delegates the authority to decide the amount of public investment to the poor, or a citizen whose capital sharer is lower than that of the median voter. In addition, the larger the regional asymmetry, the lower is the capital share of the policymaker.

Proposition 4.5.
Suppose the distribution of capital endowment is negatively skewed $\theta_{iM} > 1$. The delegation by the decisive median voter in country H is described as follows:

Delegation to the rich: When $\Lambda > 2\bar{k}(\theta_{HM} + \theta_{LM} - 2)/3$*, the capital share of the policymaker chosen through the election is higher than the median share, which implies that the policymaker is elected from the rich.*

Delegation to the median voter him-/herself: When $\Lambda = 2\bar{k}(\theta_{HM} + \theta_{LM} - 2)/3$*, the decisive median voter chooses him-/herself in the election.*

Delegation to the poor: When $\Lambda < 2\bar{k}(\theta_{HM} + \theta_{LM} - 2)/3$*, the capital share of the policymkaer chosen through the election is lower than the median share, which implies that the policymaker is elected from the poor.*

4.5 Concluding Remarks

In this chapter, we examined how a citizen is selected as policymaker in a representative democracy, and who is so selected, where each country is engaged in public investment competition to attract capital employed for production. We focus on both symmetric and asymmetric cases where two regions are respectively characterized by symmetric and asymmetric production efficiency.

In the fiscal competition literature in the context of representative democracy, it has never been explained why people choose the rich as policymakers for their countries, especially in symmetric settings (Persson and Tabellini, 1992; Ihori and Yang, 2009). In previous models, the policymaker is picked from the poor group, and his/her capital share is lower than the median of the distribution of capital endowment. However, the results are inconsistent with the straightforward intuition that politicians are rich people with social status. This inconsistency is one of our main concerns.

The study in the previous chapter is an exception. In Chapter 3, we find, exploring asymmetric fiscal competition under representative democracy, that when two regions are significantly asymmetric, a rich citizen is chosen as policymaker in one country. This seems to provide an answer to the question posed above, though not conclusive considering that the citizen elected as policymaker in the other country is extremely poor when the asymmetry between the countries is large. A country where an extremely poor citizen decides the policies to be implemented is hard to imagine in the modern economy we live in today. The right to vote and to run in elections is of course a fundamental right in most countries under representative democracy. Therefore, it is not appropriate to impose some sort of social (e.g., monetary or educational) constraint on candidates, in the theoretical analysis, so that only the rich can become policymakers. This is the reason we apply the all-citizen-candidate model in this analysis.

The model constructed in this study is based on the models of Ihori and Yang (2009) and in chapter 3, both all-citizen-candidate models with two stages, election and policymaking. The only major difference in our model is the shift from capital tax to public investment as the policy instrument. Regional governments attempting to attract capital into their regions have an incentive to control not

only the capital tax rate but also the public investment in their regions because public investment can increase returns on capital. This simple change reverses the result traditionally derived in the fiscal competition literature in the context of representative democracy.

The policy instrument shift induces a change in the game structure. Whereas tax competition is a *strategic complement* game, public investment competition is a *strategic substitute* game. This is the key factor that reverses the result. The policy instrument shift induces two other changes as well. The first concerns the relationship between public policy and capital price in the market. While an increment in the capital tax rate lowers the price of capital, because it decreases the net return on capital, an increase in public investment raises the price of capital, because it increases the net return on capital. The second concerns the relationship between the capital amount endowed with the policymaker and his/her positive attitude to public policy. A policymaker with a large amount of capital, initially, shows a positive attitude to public investment, considering the higher return on the capital, but a negative attitude to capital tax, particularly where its tax revenue is used to finance lamp-sum transfers. These three changes induced by the public policy shift work together to produce the diametrically opposite results.

Consequently, we show how a citizen whose capital share is higher than the median of the capital distribution is selected as policymaker in the sub-game perfect Nash equilibrium of this two-stage citizen-candidate model, especially in a symmetric-region setting. In other words, the model indicates how the central axis of the asymmetric election result is located at a point higher than the median. Then, the regional asymmetry in production efficiency causes the election result in each country to move away from this axis. In country H, which is characterized by relatively higher productivity, the policymaker chosen through an election becomes richer when the asymmetry increases. On the other hand, in country L, which is characterized by relatively lower productivity, the policymaker chosen through an election becomes poorer when the asymmetry increases. In particular, when the two countries are sufficiently asymmetric, the citizen whose capital share is lower than the median share is elected as policymaker in country L.

One of contributions of the analysis in this chapter is a theoretical hypothesis that policymakers in capital-importing countries are relatively rich compared to policymakers in capital-exporting countries. This hypothesis is supposed to be verified by empirical studies. In that sense, empirical studies on the relationship between a country ' s election results and the election results of capital-exporting/importing countries might be able to show which policy is more heavily weighted by citizens during elections, the capital tax rate or amount of public investment determined by politicians, because, as mentioned above, these policies induce diametrically opposite results. This question is left for future research.

Chapter 5

Strategic Delegation in Asymmetric Tax Competition with Effect of Difference-in-Capital-Endowment

In this chapter, we examine effect of difference-in-capital-endowment on the result of elections we have seen in Chapter 3, which analyzes asymmetric tax competition under representative democracy and shows that the policymaker in country H, a country with higher technology, is relatively poor compared to the policymaker in country L, a country with lower technology. If country H is endowed with more capital initially compared to country L, the difference closes the gap of the location of policymakers in the distribution of capital endowment.[1]

5.1 Introduction

Countries are different from each other in many aspects, as people are different from each other in many aspects. Varieties of national traits, foods, culture, languages, and so forth, are what we enjoy when we travel around the world or when becoming friends, and, unfortunately, can be causes of conflicts sometimes.

Even in countries under capitalistic economy and regime of representative

[1] Additionally, we examine how inefficiency of capital allocation can be improved in the appendix of this chapter. If the two types of asymmetry between the two countries exist at the same time, they ameliorate the inefficiency of capital allocation. The discussion in the appendix is based on Susa (2014).

democracy, they are different. When we say "the Western democratized country" in this modern era, the word can include not only Western Europe countries, as its name suggests, but also North American countries, Oceanian countries, East Asian countries and so on. There exists a country with large number of population, while there exists a country with small number of population. There exists a country with extremely high technology and productive efficiency, while there exists a country with moderately high technology and productive efficiency. There exists a country rich in resource and fiscal or human capital, while there exists a country poor in resource and fiscal or human capital. Even just limited to economic factors that can be quantified, we can find a lot of aspects that countries under capitalism and democracy are different about with each other.

In the literature of tax competition under representative democracy, there are few studies focusing on asymmetry between countries or regions, except for Persson and Tabellini (1992) and Chapter 3 we have seen in this dissertation paper. Persson and Tabellini (1992) refer to an asymmetry in location of the median citizen in the distribution of capital endowment and its effect; the asymmetry divides the two country into a left-winged country and a right-winged country, or in other words, a highly-redistributive-policy country and a moderately-redistributive-policy country. The difference implies that one country becomes a tax-base-exporting country and the other country becomes a tax-base-importing country, because tax bases escape from a high-taxing country into a low-taxing country. Although the structure of model is quite different from Persson and Tabellini (1992), the study in Chapter 3 has a similar mechanism with them. In Chapter 3, we assume the two countries in economy are asymmetric in productive efficiency of firms within their country. Because it makes a difference in return to capital, country H, a country with relatively high technology, becomes capital-importing country, while country L, a country with relatively low technology, becomes capital-exporting country. However, both of these two studies deal with only one factor of asymmetry between countries in the economy for clarity of analysis.

In this chapter, we examine effect of asymmetry in initial endowment of capital to results of elections in each country. Particularly, we incorporate it to the model in Chapter 3 so that we deal with two asymmetric factors at the same time to get closer to the real worlds as we mentioned above. A simple question here is whether an effect of difference-in-capital-endowment expands or shrinks the asymmetry of the election results caused by asymmetry in productive efficiency. In other words, does one more asymmetric factor induce more asymmetry in the results of election in the two country? We assume that one country has relatively high technology and more endowed capital compared to the other country, as such a situation puts us in mind of relative positions between the United States and Japan, or Japan and South Korea, and so forth.

As a result, we observe that the newly incorporated factor of asymmetry, difference-in-capital-endowment, can closed the gap of the asymmetry of elections induced by asymmetry in level of technology. This is because that the difference-in-capital-endowment also divides the two countries into capital-

importing country and capital-exporting country; if a country with relatively more amount of capital, it becomes a capital-exporting country. Therefore, if firms in such country initially have high technology, compared to firms in the other country, the effects of being capital-exporting country and capital-importing country to the result of election cancel out each other.

The remainder of this chapter is as follows. In Section 2, the model with the two types of asymmetry is provided. In Section 3, the results of election in each country in the equilibrium are derived. We discuss the effect of difference-in-capital-endowment in Section 4. Finally, we conclude in Section 5.

5.2 The Model

We construct a model following that in Chapter 3, or a model of asymmetric tax competition under representative democracy; in the two-stage citizen-candidate model based on Ihori and Yang (2009), a policymaker in each country is simultaneously determined through voting in the first stage and a tax policy in each country is simultaneously determined by the policymaker in the second stage.[2]

We assume an economy consisting of two countries, $i = H, L$. The number of inhabitants in country i is denoted by N_i. There does not exist heterogeneity among individuals about claims to labor. On the other hand, there does exist heterogeneity among individuals about claims to capital. The total amount of capital initially endowed by individuals in country i is $\bar{K}_i$ and individual j in country i has $\theta_{ij}\bar{k}_i$ units of capital, where $\bar{k}_i$ denotes an average amount of initially endowed capital in country i; $\bar{k}_i \equiv \bar{K}_i/N_i$, and θ_{ij} is defined as $\bar{k}_{ij}/\bar{k}_i$: the ratio between the average and the capital amount initially endowed by individual j in country i.

What we concern in this chapter is effect of difference-in-capital-endowment on the results of elections in each country involved in tax competition, particularly, in the case where the countries are asymmetric in production technology as we have seen in Chapter 3. We can obtain results and their implications simply and clearly, if the number of asymmetric factors is just one. However, countries or regions are different from each other in much more aspects in reality. For instance, imagine differences between the United States and Japan. We can easily find various kinds of difference between the two country; while they both are under regime of representative democracy and highly developed countries, the United States has not only much more leading companies of the world, but also much more capital than Japan does. The asymmetry in technology level of production sector and its effects on results of elections have been analyzed already. However, what if difference-in-capital-endowment exists in the model at the same time as the reality shows? To see it, we assume that capital per capita in country H, a country with relatively higher technology as defined precisely later, can be higher than that of country L, a country with

[2] As mentioned in Chapter 3, Ihori and Yang (2009) incorporate the two-stage citizen-candidate model into a canonical model of capital tax competition, following Osborne and Slivinski (1996), Besley and Coate (1997), and Besley and Coate (2003).

relatively lower technology. Following Itaya et al. (2008), when we define the average amount of capital per capita of the whole economy as $\bar{k}$, we can express the difference-in-capital-endowment as follows: $\bar{k}_H = \bar{k} + \epsilon$ and $\bar{k}_L = \bar{k} - \epsilon$, where $0 \leq \epsilon < \bar{k}$. We can easily confirm that the total amount of capital per capital as the whole economy is not changed from the model of Chapter 3; $\bar{k}_H + \bar{k}_L = (\bar{k} + \epsilon) + (\bar{k} - \epsilon) = 2\bar{k}$.

All firms in each country are participants of perfectly competitive market and produce numeraire private goods with CRS (Constant-Return-to-Scale) technology, employing labor and capital, $F_i(K_i) = (A_i - (K_i/N_i))K_i$. Here, we assume that all individuals supply their labor force inelastically. Additionally, we can rewrite this production function in term of per-labor (per-capita) as $f^i(k_i) = (A_i - k_i)k_i$, where A_i captures the level of productive efficiency of firms in country i and k_i denotes the amount of capital employed by firms in country i.[3] The regional asymmetry in the level of productive efficiency is defined by $\Lambda \equiv A_H - A_L (\geq 0)$.

The government in country i levies unit tax rate T_i on capital employed by firms in the country. Perfect mobility of capital between the two countries is assumed here. In addition to the mobility, market clearing conditions imply

$$r = f_k^i(k_i) - T_i, \tag{5.1}$$
$$2\bar{k} = k_H + k_L, \tag{5.2}$$

where r is the price of capital. From (5.1) and (5.2), we can derive the amount of capital employed in country i and the price of capital as

$$k_i = \bar{k} + \frac{A_i - A_{-i} - T_i + T_{-i}}{4}, \tag{5.3}$$
$$r = \frac{\Omega}{2} - 2\bar{k} - \frac{T_H + T_L}{2}, \tag{5.4}$$

where $\Omega \equiv A_H + A_L$. As mentioned above, the government in each country levies unit tax on employed capital and redistributes the tax revenue to every citizen within the country in lump-sum manner. The tax revenue, or the amount of redistributive transfer, is given by

$$g_i = T_i k_i. \tag{5.5}$$

Income of each individual in country i is composed of labor income, $f^i(k_i) - f_k^i(k_i)k_i$, return from capital endowed initially and invested to the market, $r\theta_{ij}\bar{k}_i$, and lump-sum transfer from the local government, $T_i k_i$. Let the utility function of individual j in country i be linear; $u(c_{ij}) = c_{ij}$, where c_{ij} is

[3]The quadratic form of production function has been used in Bucovetsky (1991), Peralta and Van Ypersele (2005), Itaya et al. (2008), Kempf and Rota-Graziosi (2010), and so forth. By using this type of production function, we can derive solutions explicitly, even in two-stage game as we set in this model.

defined to be the level of consumption of private goods. As the price of private good is defined as one and the consumer's budget constraint is denoted as $f^i(k_i) - f^i_k(k_i)k_i + r\theta_{ij}\bar{k}_i + T_i k_i$, the utility function of individual j in country i is given as follows:

$$u(c_{ij}) = c_{ij} = f^i(k_i) - f^i_k(k_i)k_i + r\theta_{ij}\bar{k}_i + T_i k_i. \tag{5.6}$$

With (5.1) and average amount of initially endowed capital in each country, $\bar{k}_H = \bar{k} + \epsilon$ and $\bar{k}_L = \bar{k} - \epsilon$, this utility function can be rewritten as

$$u(c_{Hj}) = f^H(k_H) + r[(\theta_{Hj} - 1)(\bar{k} + \epsilon) + (\bar{k} + \epsilon - k_H)],$$
$$u(c_{Lj}) = f^L(k_L) + r[(\theta_{Lj} - 1)(\bar{k} - \epsilon) + (\bar{k} - \epsilon - k_L)]$$

for individual j in country H and L, respectively. This formulation of utility function implies that the utility consists of gross national production per capita and income/expenditure based on capital exporting/importing. Based on these assumptions we set above, we can create the situation where the heterogeneity of individuals are solely reflected by the incentive to control the terms-of-trade, or the capital price (Peralta and Van Ypersele, 2005; Itaya et al, 2008; and Ogawa, 2013). As defined in Chapter 3, we can divide this incentive into the two types of terms-of-trade effects, *intra*- and *inter*-terms-of trade effects. The first term in the bracket captures an incentive to control terms-of-trade through capital tax policy depending only on the relative position of individual in the distribution of capital endowment within his/her country. On the other hand, the second term in the bracket captures an incentive to control terms-of-trade through capital tax policy depending only on the relative position of his/her country, capital-importing or -exporting country, comparing the amounts of average level of capital endowed initially and capital employed with in his/her country.

5.3 Equilibrium

Following Chapter 3, we define the timing of the game as follows:

1. An election to pick a policymaker is held simultaneously in each country. It is assumed that all citizens are candidates and have a right to vote in this election. No one can waiver the right and refuse to be a policymaker, once he/she is picked through the voting. The authority to set a capital tax rate within a country is delegated to a citizen picked in this election.

2. A capital tax rate T_i is chosen by the policymaker picked through the election in the first stage. This is determined simultaneously and independently.

After a capital tax rate is set within each country, firms produce private goods to maximize their profits and individuals consume these private goods with

their budget constraints. We apply a sub-game perfect Nash equilibrium as the equilibrium concept for this game. In order to obtain the equilibrium, we solve this game backwards.

5.3.1 Second Stage: Tax Competition

Let utility level of the policymaker in country i be denoted as u_{iP} and the policymaker have $\theta_{iP}\bar{k}_i$ units of capital. Taking a capital tax rate in the other country T_{-i} given, the policymaker determines the capital tax rate of his/her country in order to maximize his/her utility.

$$\begin{array}{ll} \max_{T_i} & u_{iP} = (A_i - k_i)k_i + r[(\theta_{iP} - 1)\bar{k}_i + (\bar{k}_i - k_i)], \\ \text{s.t.} & (5.3) \text{ and } (5.4). \end{array}$$

The reaction functions in country H and L are derived from the first-order condition of the maximization problem above as

$$T_H(T_L) = \frac{1}{3}T_L + \frac{4\bar{k} - 4\theta_{HP}(\bar{k} + \epsilon) + \Lambda}{3}, \tag{5.7}$$

$$T_L(T_H) = \frac{1}{3}T_H + \frac{4\bar{k} - 4\theta_{LP}(\bar{k} - \epsilon) - \Lambda}{3}, \tag{5.8}$$

respectively. Solving the simultaneous equations of (5.7) and (5.8), we obtain the capital tax rate of country H and L in the equilibrium of this sub-game as

$$T_H = \frac{8\bar{k} - 6\theta_{HP}(\bar{k} + \epsilon) - 2\theta_{LP}(\bar{k} - \epsilon) + \Lambda}{4}, \tag{5.9}$$

$$T_L = \frac{8\bar{k} - 6\theta_{LP}(\bar{k} - \epsilon) - 2\theta_{HP}(\bar{k} + \epsilon) - \Lambda}{4}, \tag{5.10}$$

respectively. Substituting (5.9) and (5.10) into (5.3) and (5.4), we obtain the equilibrium values of capital amount in each country and capital price in this sub-game as follows:

$$k_H = \bar{k} + \frac{2\theta_{HP}(\bar{k} + \epsilon) - 2\theta_{LP}(\bar{k} - \epsilon) + \Lambda}{8}, \tag{5.11}$$

$$k_L = \bar{k} + \frac{2\theta_{LP}(\bar{k} - \epsilon) - 2\theta_{HP}(\bar{k} + \epsilon) - \Lambda}{8}, \tag{5.12}$$

$$r = \frac{\Omega + 2\theta_{HP}(\bar{k} + \epsilon) + 2\theta_{LP}(\bar{k} - \epsilon) - 8\bar{k}}{2}. \tag{5.13}$$

5.3.2 First Stage: Political Competition

In this simplified model of political process under representative democracy, every citizen is a candidate who can be a policymaker in his/her country and

has a right to vote in the election. As shown in Chapter 3, the citizen, who is located at the median in the distribution of capital endowment within each country, is the decisive voter in this political competition because the well-known median voter theorem holds in this model.[4] Therefore, what we focus here is to whom the median voter delegates the authority to determine a capital tax rate in each country.

Let the utility level of the median voter in country i denoted as u_{iM} and the median voter have $\theta_{iM}\bar{k}_i$ units of capital. Taking account of the equilibrium value of the sub-game in the next tax-competition stage, the median voter choose a citizen for policymaker in his/her country in order to maximize his/her utility:

$$\begin{array}{cc} \max_{\theta_{iP}} & u_{iM} = (A_i - k_i)k_i + r[(\theta_{iM} - 1)\bar{k}_i + (\bar{k}_i - k_i)], \\ \text{s.t.} & (5.11) \text{ for } i = H, (5.12) \text{ for } i = L, \text{and } (5.13). \end{array}$$

The reaction functions in country H and L are yielded from the first-order condititon of the maximization problem as

$$\theta_{HP}(\theta_{LP}) = \frac{\bar{k} - \epsilon}{5(\bar{k} + \epsilon)}\theta_{LP} + \frac{16\theta_{HM}(\bar{k} + \epsilon) - 8\bar{k} - \Lambda}{10(\bar{k} + \epsilon)}, \tag{5.14}$$

$$\theta_{LP}(\theta_{HP}) = \frac{\bar{k} + \epsilon}{5(\bar{k} - \epsilon)}\theta_{HP} + \frac{16\theta_{LM}(\bar{k} - \epsilon) - 8\bar{k} + \Lambda}{10(\bar{k} - \epsilon)}, \tag{5.15}$$

respectively. Solving the simultaneous equations of (5.14) and (5.15), the policymakers in country H and L in the sub-game perfect Nash equilibrium are characterized as

$$\theta^*_{HP} = \frac{1}{12(\bar{k} + \epsilon)}[20\theta_{HM}(\bar{k} + \epsilon) + 4\theta_{LM}(\bar{k} - \epsilon) - 12\bar{k} - \Lambda], \tag{5.16}$$

$$\theta^*_{LP} = \frac{1}{12(\bar{k} - \epsilon)}[20\theta_{LM}(\bar{k} - \epsilon) + 4\theta_{HM}(\bar{k} + \epsilon) - 12\bar{k} + \Lambda], \tag{5.17}$$

respectively. Substituting (5.16) and (5.17) into (5.9)-(5.13), we obtain the capital tax rates, amount of capital employed in country H and L and the price of capital in the equilibrium, respectively, as follows:

[4] A rigorous proof for the median voter theorem in this asymmetric tax competition model is provided in Chapter 3. The process to specify the decisive voter in this election is omitted here.

$$T_H^* = \frac{12\bar{k} - 4\theta_{LM}(\bar{k}-\epsilon) - 8\theta_{HM}(\bar{k}+\epsilon) + (A_H - A_L)}{3}, \tag{5.18}$$

$$T_L^* = \frac{12\bar{k} - 4\theta_{HM}(\bar{k}+\epsilon) - 8\theta_{LM}(\bar{k}-\epsilon) + (A_L - A_H)}{3}, \tag{5.19}$$

$$k_H^* = \bar{k} + \frac{(A_H - A_L)}{12} + \frac{\theta_{HM}(\bar{k}+\epsilon) - \theta_{LM}(\bar{k}-\epsilon)}{3}, \tag{5.20}$$

$$k_L^* = \bar{k} + \frac{(A_L - A_H)}{12} + \frac{\theta_{LM}(\bar{k}-\epsilon) - \theta_{HM}(\bar{k}+\epsilon)}{3}, \tag{5.21}$$

$$r^* = \frac{\Omega}{2} - 6\bar{k} + 2\theta_{HM}(\bar{k}+\epsilon) + 2\theta_{LM}(\bar{k}-\epsilon). \tag{5.22}$$

When the two countries are symmetric in initial capital endowment, $\epsilon = 0$, we can confirm that these equations above, (5.16)-(5.22), are exactly same result we have derived in Chapter 3, (3.12)-(3.15).

5.4 Effect of Difference-in-Capital-Endowment

5.4.1 The Location of the Policymaker

Here, we examine effect of asymmetry between the two country in capital endowment on the results of election in each country, particularly, in case where the two countries are basically asymmetric in productive efficiency as we have seen in Chapter 3. As the main result of Chapter 3, we observe there exists a gap in the locations of the policymakers in the distribution of capital endowment; the policymaker in country H, a relatively-high-technology country, is relatively poor compared to the policymaker in country L, a relatively-low-technology country.

For the starting point of analysis, we answer to a question who becomes the policymaker, excluding all kinds of asymmetry between the two countries except for the difference-in-capital-endowment; we assume the shapes of the distribution of capital endowments, particularly, the locations of the median are symmetric, $\theta_{HM} = \theta_{LM} \equiv \theta_M$, and the productive efficiency are symmetric, $\Lambda = 0$. With these assumptions, let the policymaker in country i in the equilibrium have $\theta_{iP}^{**}\bar{k}$ units of capital. To find the locations of the policymakers in the distributions of capital endowment, we compare the capital share of the policymakers and that of the median as follows:

$$\theta_{HP}^{**} - \theta_M = \frac{1}{3(\bar{k}+\epsilon)}[-3\bar{k}(1-\theta_M) + \epsilon], \tag{5.23}$$

$$\theta_{LP}^{**} - \theta_M = \frac{1}{3(\bar{k}-\epsilon)}[-3\bar{k}(1-\theta_M) - \epsilon]. \tag{5.24}$$

As typically observed in the real world, we assume the distributions of capital endowment are skewed positively, that is, $\theta_M \in [0, 1)$, through the following analysis.

If there exists no asymmetry at all between the two countries, $\epsilon = 0$, the authority to set a tax rate in each country is delegated to a citizen whose capital share is lower than that of the median, that is, what we call here, to the poor. This is the results derived in Persson and Tabellini (1992), Ihori and Yang (2009), as well as Chapter 3. However, the asymmetry in capital endowment works to the opposite direction in each country, compared to asymmetry in productive efficiency. The results of elections in each country are summarized in the following propositions.

Proposision 5.1.

Assume that the distribution of capital endowment is positively skewed, that is, $\theta_M \in [0, 1)$. The delegation of the authority to set a capital tax rate in country H is characterized as follows.

Delegation to the poor: When $\epsilon < 3\bar{k}(1 - \theta_M)$, 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 $\epsilon = 3\bar{k}(1 - \theta_M)$, the citizen at the median votes for himself/herself.

Delegation to the rich: When $\epsilon > 3\bar{k}(1 - \theta_M)$, 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 (5.23).

Proposition 5.2.

Assume that the distribution of capital endowment is positively skewed, that is, $\theta_M \in [0, 1)$. The decisive median in country L delegates the authority to set a capital tax rate to the poor always. The larger the magnitude of asymmetry (ϵ) is, the lower is the policymaker's capital share, compared to that of the median.

Proof. From (5.24), $\theta_{LP}^{**} < \theta_M$ when $\theta_M \in [0, 1)$.

Remember the result we have seen in Chapter 3. The country in which the decisive median voter always delegates the authority to the poor is country H, when we assume the factor of regional asymmetry is productive efficiency of firms in each country. However, the result of the elections in each country is reversed when we assume the factor of regional asymmetry is initial endowment of capital; the policymaker in country L is relatively rich, compared to the policymaker in country H.

Following the previous chapters, we can give a graphical representation of the results summarized in Proposition 5.1 and 5.2. Note that we assume that the distributions of capital endowment in both countries are symmetric and skewed positively, while we refer to the cases with negatively skewed distributions in previous chapters.

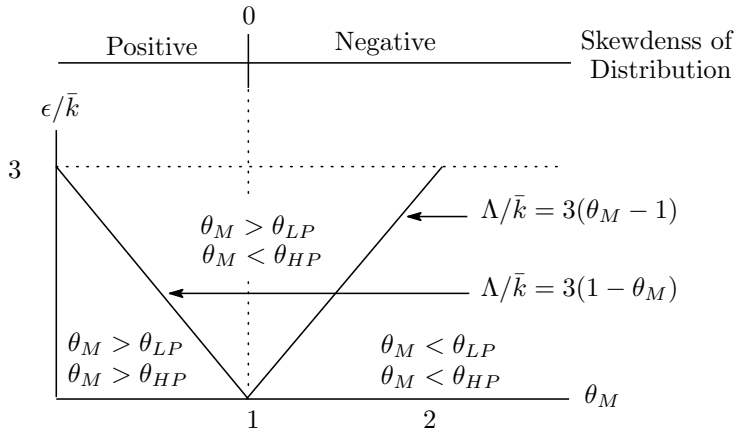

Figure 5.1. Equilibrium classification

In turn, we set a question asking whether the effect of difference-in-capital-endowment shrinks or expands the gap of the location of policymakers in the two country, when we incorporate the asymmetry in capital endowment into the model, at the same time with the asymmetry in technology level. To see it simply, we differentiate the gap between the policymakers' capital share with respect to the asymmetry in capital endowment, ϵ, and evaluate it when $\epsilon = 0$ as

$$\frac{\partial}{\partial \epsilon}(\theta^*_{LP} - \theta^*_{HP})\bigg|_{\epsilon=0} = \frac{2k^3}{3(k^2 - \epsilon^2)^2}(\theta_{HM} + \theta_{LM} - 3). \tag{5.25}$$

It is easily confirmed that the sign of this derivative is always negative as long as we assume the distributions of capital share in both countries are positively skewed, $\theta_{iM} \in [0, 1)$. Therefore, the effect of difference-in-capital-endowment in an asymmetric tax competition model under representative democracy is summarized in the following proposition.

Proposition 5.3.
Assume that the distributions of capital endowment in both countries are positively skewed, that is, $\theta_{iM} \in [0, 1)$ and the countries are basically asymmetric in level of productive efficiency. To the result of elections, the effect of difference-in-capital-endowment works in the direction to close the gap initially.

Proof. With assumption $\theta_{iM} \in [0, 1)$, the sign of (5.25) is negative.

5.4.2 Determinants of the Location

As analyzed in previous chapters, particularly in Chapter 3 and Chapter 4, the same mechanism works to determine the location of policymaker in the

distribution of capital endowment. The key factors are twofold : the structure of the game under representative democracy and the terms-of-trade effect. For here, explanations for these two key factors are simplified, following detailed ones in the previous chapters.

The Structural Feature of the Game

This game has two stages; after citizens in each country vote for the most preferable candidate, who can maximize voters' utility, in the first stage, the policymaker in each country determines capital tax policy to maximize the policymakers' utility. The point is that capital tax policies are strategically interdependent because the capital market is integrated and a tax policy in one country affects an amount of capital in the other country. If we try to find path connecting voting behavior of a citizen to utility of his/hers under this situation, we can number two paths. One of the two is straightforward. It is the path through the tax policy of his/her country, which is directly determined by the policymaker of his/her country. The other one is the path through both of tax policies of his/her country AND the adversary, because of the strategic interdependency. If the two countries are not connected by the integrated capital market, the path which we have to take into consideration is only the former one. Here, there is no reason for each citizen to vote on any other candidates, but him-/herself, so as to decide the capital tax policy as he/she wants. However, once the capital market is integrated, the latter path shows up as well as the former one. In this situation, there exists an incentive to delegate the authority for tax policy in his/her country to other citizen, in order to affect tax policy in the other country and gain higher utility compared to the case where the voter him-/herself determines tax policy.

Voters can decide who they vote for *ex ante*, or before election, while policymakers have to determine what capital tax rate they set *ex post*, or after election. This structure of the two-stage game implies that voters can take advantage because voters in one country can foresee which candidate react to a tax policy of the other country. Therefore, when voters choose his/her policymaker, or a reaction curve of capital tax policy in the country, taking a policymaker of the other country, or a reaction curve of it in the other country as given, there seems to be a room to increase his/her utility compared to the case where the citizen him-/herself becomes a policymaker.

The Terms-of-Trade Effects

What gives voters an incentive to affect the public policy in adversary country is an increment of utility gained by controlling the price of capital; it is called terms-of-trade effect in the literature of asymmetric tax competition. In this model, citizens in a country are heterogeneous about initial endowment of capital, which implies that they are different in what is the best capital price for each one of them; some one prefers a higher price, while other one prefers a lower price of capital. Particularly, if a citizen is initially endowed with an amount

of capital more(less) than an amount of capital per capita employed by firms in his/her country, he becomes a capital exporter(importer) at a personal level. Then, he has an incentive to control in order to realize a higher(lower) price of capital in the market, by delegating to other citizen and affecting tax policy in the adversary country. In the equilibrium of this political voting model, the position of the median voter matters because the median voter theorem holds as well known. What determines whether the median voter in each country is a capital importer or a capital exporter? We can enumerate three factors as the determinants as follows:

- Skewness of the Distribution
  If there is no asymmetry between the two countries, the amount of capital per capita employed by firms in each country is the average, $\bar{k}$. In this case, the median voter is a capital importer as long as we assume the distribution of capital endowment is positively skewed. Then, the median voter has an incentive to lower the price of capital. This is defined as the *intra*-terms-of-trade effect in Chapter 3.

- Asymmetry in Productive Efficiency
  A country with relatively higher productive efficiency becomes a capital-importing country, while a country with relatively lower productive efficiency becomes a capital-exporting country. If the distribution of capital endowment is not skewed at all, that is, the median and the average are located at the same point, and there is no any other asymmetry between the two countries, the median voter in country H becomes a capital importer and has an incentive to lower the price of capital, while the median voter in country L becomes a capital exporter and has an incentive to heighten the price of capital. This is defined as the *inter*-terms-of-trade effect in Chapter 3.

- Asymmetry in Capital Endowment
  A country with more capital endowed initially becomes a capital-exporting country, while a country with relatively less capital endowed initially becomes a capital-importing country. If the distribution of capital endowment is not skewed at all and there is no any other asymmetry between the two countries, the median voter in country H becomes a capital exporter, while the median voter in country H becomes a capital importer. This can be classified as the *inter*-terms-of-trade effect because it is due to the asymmetry between the countries, not the heterogeneity among citizens.

Based on these three determinants, we can interpret the location of the policymakers in the distribution in the equilibrium, or the voting behavior of the median voter in each country. If the median voter in one country is a capital importer(exporter) as a result of interaction of the three determinants above, he/she gains a higher level of utility by lowering(heightening) the price of capital in the market. The median voter can lower(heightening) the price of capital by heightening(lowering) the tax rate in the other country because

heightening(lowering) tax rate leads to decrease(increase) a return from capital. In turn, he/she can heighten(lower) the tax rate in the other country by heightening(lower) the tax rate in his/her country because tax rates are *strategic complements* in a game of tax competition. Finally, he/she can heighten(lower) the tax rate in his/her country by delegating the authority of capital tax rate to the poor(rich) because the poor(rich) prefer more(less) redistribution and higher(lower) tax rate to realize it.

The key determinant in this analysis is the third one, the asymmetry in capital endowment between the two countries. As shown in Proposition 1 and 2, the policymaker in country H, a country with more capital, is relatively rich compared to the policymaker in country L, a country with less capital. This is because the median voter in country H has relatively strong incentive to heighten the price of capital. In other words, this is because the median voter in country L has relatively strong incentive to lower the price of capital.

If the two types of asymmetry exist at the same time, that is, country H has more amount of capital initially and higher technology, compared to country L, the two types of *inter*-terms-of-trade effects works to the opposite direction and cancel out each other. This is why the gap of the location of policymakers shrinks when we add the asymmetry in capital endowment to the framework we deal with in Chapter 3.

5.5 Concluding Remarks

In this chapter, we examined an asymmetric tax competition between a country with relatively high productive efficiency and more capital endowment and a country with relatively low productive efficiency and less capital endowment, under political regime of representative democracy; particularly, we study effects of difference-in-capital-endowment to the election results that we have derived with an asymmetric tax competition model where asymmetric factor is only about level of technology in Chapter 3. If we assume there exist two types of asymmetry between the countries, the gap of policymakers' locations in the distribution of capital endowment can be shrunk, not expanded, compared to the case where either one of them exists. This is because, from the view point of terms-of-trade effect, the effects of being a high-tech country and a richly-endowed country can cancel out each other; a country with high technology becomes a capital-importing country, while a country with more capital endowment becomes a capital-exporting country.

Appendix

A.1 Asymmetric Tax Competition and Inefficiency of Capital Allocation

In this appendix, we focus on situations in which countries are asymmetric, and explore how the asymmetry affect the efficiency of capital allocation in the presence of agglomeration. The key conclusions of this study show that the difference-in-capital-endowment can ameliorate the inefficiency of capital allocation between countries caused by pecuniary externality from difference-in-technology, which is even deteriorated by capital agglomeration effects on production technologies.

Most analyses of tax competition did not discuss agglomeration economies, until the study by Fernandez (2005), who used the approach of Chipman (1970).[5] Technological externalities, which commonly appear in city formation literature, play a key role in this approach.[6] An increase in the amount of capital in a country has the external effect of increasing the productivity of all firms in the country, while these firms are competitive and believe that each of their operations are running under constant returns to scale. While firms do not account for the external effects associated with their production, the local government is aware of it. In contrast to the case in which the agglomeration economies are absent, the governments aggressively reduce their capital tax rates to benefit from the agglomeration economies, thus further aggravating the under-provision of public goods. This is because capital flight means not only tax-base flight, but also productivity flight. The government concern about capital flight is therefore heightened, thus further lowering the tax rate. This is the main finding of Fernandez (2005).[7]

Our study takes the exploration of this area a step further. While Fernandez (2005) focuses on the effects of agglomeration economies on the efficiency of providing public goods, the study does not explore the efficiency of capital allocation. Based on the less general, but clear and concise model, we investigate whether asymmetry in capital endowment improves or aggravates the efficiency of capital allocation in economy with asymmetry in technology and capital agglomeration effects. The results show that whereas pecuniary externality arose from technological asymmetries causes the inefficiency of capital allocation, difference-in-capital-endowment can ameliorate it, because it weak-

[5]Some recent papers, for example, Kind, Knarvik, and Schjelderup (2000), Ludema and Wooton (2000), Baldwin and Krugman (2004), and Burbidge and Cuff (2005), deal with tax systems in the presence of agglomeration economies, but their settings for the model are quite different to standard tax competition models.

[6]For theoretical studies in city formation with agglomeration economies, see Arnott (1979) and Henderson (1974, 1988). For empirical studies with this topic, see Moomaw (1981) and Henderson (1986). Fujita and Thisse (2000) furnish a comprehensive survey of agglomeration economies and city formation.

[7]Fernandez (2005) also refers to the case in which the countries are asymmetric in population. The study's conclusion points out that under-provision of public goods occurs in the country that exports capital, while over- or under-provision may occur in the country that imports the capital.

ens or cancels out the incentive to manipulate the terms of trade (capital price). Moreover, even in the presence of agglomeration economies, which deteriorates the inefficiency, the same mechanism works with larger degree of difference-in-capital-endowment.

This appendix is organized as follows. Subsection 2 presents the model. To capture the effects of agglomeration economies on capital allocation, we extend the model of Fernandez (2005) and, for simplicity, specify the formulas. Subsection 3 examines the equilibrium and provides an interpretation of the results. Finally, subsection 4 concludes.

A.2 Model

In our model, the economy consists of two countries, country H and country L. Following the setting of Itaya, Okamura, and Yamaguchi (2008), we assume that countries are asymmetric in terms of production technology and initial endowment of capital. Population in each country is normalized as 1. While the residents are immobile, capital can move freely across the countries.

Production with capital agglomeration

In each country, perfectly competitive firms produce numeraire private goods, by using capital and labor. The production function in country $i(i = H, L)$ is a homogeneous function of its input factors

$$Y_i = F_i(K_i, N) = \left(A_i - \frac{K_i}{N}\right) K_i, \tag{A.1}$$

where K_i and $N(= 1)$ denote capital and labor input in country i, respectively. In addition, A_i indicates the level of firms technology in country i, which is assumed to be given by

$$A_i = a_i + \delta \frac{K_i}{N}. \tag{A.2}$$

$\delta(\geq 0)$ captures the magnitude of the agglomeration economies; when $\delta = 0$, the capital agglomeration effect is not present. Technological asymmetry between the countries without agglomeration economies is represented by a_i. It does not intend to capture regional differences in a limited sense, but it represents the productivity differences in a broad sense, including the differences in the business custom, labor quality, and regulatory measure etc.. While the technological difference may disappear relatively quickly through the information spillovers, other factors that distinguish countries are difficult to converge to the same level, at least in the short run. Hence, we assume the differences in a_i persist, and that in the following analysis, we denote $\Lambda \equiv a_H - a_L \geq 0$.

The perfectly competitive firms do not recognize their effects on the agglomeration economies in the country, and deal with their own technology level as parametric, following the approach of Chipman (1970) and the Fernandez (2005). Using (A.1), the production function per capita is given by

$$f(k_i) = (A_i - k_i)k_i, \tag{A.3}$$

where $k_i(\equiv K_i/N)$ is the amount of capital per capita in country i. The profit maximization problem of the firms is formulated as

$$\max_{k_i} \pi_i = (A_i - k_i)k_i - w_i - (r + T_i)k_i,$$

where w_i, r, and T_i are the wage rate, net rate of return to capital, and the tax (subsidy) rate, respectively.

With the assumption that markets of input factors are perfectly competitive, the first-order condition and zero-profit condition derive equations for the net rate of return to capital and wage rate as:

$$r = A_i - 2k_i - T_i, \tag{A.4}$$
$$w_i = k_i^2. \tag{A.5}$$

From equation (A.4), we have

$$a_H - k_H(2 - \theta) - T_H = a_L - k_L(2 - \theta) - T_L. \tag{A.6}$$

The amount of initial endowment differs between country H and L. We assume that the initial amount of capital per capita in country i is given by $\bar{k_H} = \bar{k} + \epsilon$ and $\bar{k_L} = \bar{k} - \epsilon$, respectively, where $\bar{k}$ is the amount of capital per capita, on average. This setting indicates that there is no asymmetry in the initial endowment of capital if $\epsilon = 0$, and the total amount of capital in this economy is given by $2\bar{k}$,

$$k_H + k_L = 2\bar{k}. \tag{A.7}$$

From (A.4), (A.6), and (A.7), the amount of capital in country i and the net rate of return to capital are

$$k_H = \bar{k} + \frac{\Lambda - T_H + T_L}{2(2 - \delta)}, \tag{A.8}$$
$$k_L = \bar{k} - \frac{\Lambda - T_H + T_L}{2(2 - \delta)}, \tag{A.9}$$
$$r = \frac{\Omega - T_H - T_L - 2\bar{k}(2 - \delta)}{2}, \tag{A.10}$$

where $\Omega \equiv a_H + a_L$. From (A.8) and (A.9), we have

$$\frac{\partial k_i}{\partial T_i} = -\frac{1}{2(2 - \delta)} < 0,$$

indicating that the capital flow is more sensitive to tax change as the magnitude of the agglomeration economies increases. Hence, by the marginal reduction of T_i, the governments can attract more capital when δ is high.

A.3 Residents and governments

Immobile residents in each country consume private goods and public goods. The utility function of an individual in country i is represented by

$$u(c_i,\, g_i) = c_i + g_i, \tag{A.11}$$

where c_i and g_i denote consumption of private goods and public goods, respectively.[8] Individuals finance their private good consumption from their wage and the return of initial endowment of capital:

$$c_i = w_i + r\bar{k_i}. \tag{A.12}$$

Suppose that the regional governments finance the public goods from capital tax revenue,

$$g_i = T_i k_i. \tag{A.13}$$

Benevolent governments determine their tax rates to maximize the welfare of residents in their country. Using (A.5), (A.11), (A.12), and (A.13), the maximization problem for government i is given by $\max_{T_i} u_i = k_i^2 + r\bar{k_i} + T_i k_i$. Besides, with $r = f'(k_i) - T_i$, the objective function of country i can be rewritten as

$$u_i = f(k_i) + r(\bar{k_i} - k_i), \tag{A.14}$$

that is, welfare in country i is composed of total production and the net return to capital.

One of the key factors of this model is recognizing the existence of the capital agglomeration effect. Contrary to each firms' recongnition, the government sets the tax policy for the whole industry, with the effect of increasing its returns to scale from capital agglomeration in the country. As a result of this effect, the marginal return from capital must be decreasing; the capital demand curve for the tax rate must slope downwards and to the right. Otherwise, the tax rate under consideration would not exist uniquely and stably. Thus, from equation (A.2) and (A.3), $f''(k_i) = 2(\delta - 1) < 0$ must be satisfied. Here, we set an assumption for the range of values that δ can take.

Assumption 1: $\delta < 1$

Under this assumption, the capital demand function for the firms in each country is decreasing with the tax rate of its country and increasing with that of the other country. This implies that capital outflows from the country increase with an increase in the tax rate, and flow into the other country.

[8] g_i can be interpreted as a lump-sum transfer/tax. This specification allows us to analyze the terms of trade effect [Grazzini and van Ypersele (2003), Peralta and van Ypersele (2005) and Itaya, Okamura, and Yamaguchi (2008)].

A.4 Capital allocation in equilibrium

Equilibrium tax rates

Here, we derive the tax rates in equilibrium. By considering the policy determination of the other as given, each government determines the tax rate to maximize its own welfare. Solving the maximization problem, the best-response functions for each country are obtained as follows:

$$T_H = \frac{1-\delta}{3-2\delta}T_L - \frac{(2-\delta)\,\delta\bar{k} - (1-\delta)\,\Lambda + (2-\delta)^2\,\varepsilon}{3-2\delta}, \tag{A.15}$$

$$T_L = \frac{1-\delta}{3-2\delta}T_H - \frac{(2-\delta)\,\delta\bar{k} + (1-\delta)\,\Lambda - (2-\delta)^2\,\varepsilon}{3-2\delta}. \tag{A.16}$$

These equations imply that the tax rates are strategic complements, $\partial T_i/\partial T_j > 0$. In addition, (A.15) and (A.16) yield

$$T_H^* = \frac{\Lambda\,(1-\delta) - \varepsilon\,(2-\delta)^2}{4-3\delta} - \delta\bar{k}, \tag{A.17}$$

$$T_L^* = -\frac{\Lambda\,(1-\delta) - \varepsilon\,(2-\delta)^2}{4-3\delta} - \delta\bar{k}. \tag{A.18}$$

as the tax rates in the Nash equilibrium.[9]

Benchmark for efficiency of capital allocation

To study the effects of agglomeration economies and regional asymmetry on the efficiency of capital allocation, we compare tax rate gap in the equilibrium and that of what maximizes the output of this society. The former is derived from (A.17) and (A.18) as follows:

$$T_H^* - T_L^* = \frac{2(1-\delta)\Lambda - 2\epsilon(2-\delta)^2}{4-3\delta}. \tag{A.19}$$

The latter is obtained by considering the problem of total output of the two countries: maximization of $f_H(k_H) + f_L(k_L)$ subject to the constraint that $k_H + k_L = 2\bar{k}$. If we maximize

$$[a_H + (\delta-1)k_H]k_H + [a_L + (\delta-1)(2\bar{k} - k_H)](2\bar{k} - k_H) \tag{A.20}$$

with respect to k_H, the first order condition is

$$\Lambda + 2(\delta-1)(k_H - k_L) = 0, \tag{A.21}$$

[9] We can verify that the stability condition for this Nash equilibrium is satisfied within the range of θ we set in Assumption 1 as follows: $\left| \begin{smallmatrix} \partial^2 u_H/\partial T_H^2 & \partial^2 u_H/\partial T_H \partial T_L \\ \partial^2 u_L/\partial T_L \partial T_H & \partial^2 u_L/\partial T_L^2 \end{smallmatrix} \right| > 0 \Leftrightarrow \delta < 4/3$.

implying that there is an interior solution if and only if $\delta < 1$ and $4\bar{k}(1-\delta) > \Lambda$. As to assume that allocation of a non-zero amount of capital to country L is to be efficient, we set an assumption for the parameters as follows:

Assumption 2: $4\bar{k}(1-\delta) > \Lambda$

Hence, we have the output-maximizing allocation of capital which obeys

$$k_H - k_L = \frac{\Lambda}{2(1-\delta)}. \tag{A.22}$$

With the mobile capital and profit-maximizing firms which don't recognize the agglomeration economies, the allocation of capital to the two countries is yielded from (A.8) and (A.9) as follows:

$$k_H - k_L = -\frac{T_H - T_L}{2-\delta} + \frac{\Lambda}{2-\delta}. \tag{A.23}$$

Hence, the efficient tax rate gap, which equates the right hand side of (A.22) and (A.23), is defined as

$$(T_H - T_L)^{eff} = -\frac{\delta}{2(1-\delta)}\Lambda \tag{A.24}$$

This is a negative number whenever $0 < \theta < 1$ and $\Lambda > 0$, which implies that the efficient tax rate in country L must be higher than that of country H.

Regional asymmetries, agglomeration effects, and efficiency of capital allocation

With the two tax rate gaps derived in the previous subsection, we explore relation among regional asymmetry, agglomeration effects and efficiency of capital allocation. The regional asymmetry in capital endowments $\bar{k}+\epsilon$ and $\bar{k}-\epsilon$ does not matter for the efficiency calculation, but do matter for the Nash equilibrium derived by (A.19). The right hand side of (A.19) is positive when $\epsilon = 0$ and a decreasing function of ϵ, while the efficient tax rate gap indicated by (A.24) is a negative number. Therefore, taking technological asymmetry Λ and capital agglomeration effects δ as given, we focus on asymmetry in capital endowment as a factor which improves the efficiency of capital allocation. There is a best positive value for the difference-in-capital-endowment parameter ϵ^{eff}, obtained as the value of ϵ which equates the right hand side of (A.19) and (A.24), as follows:

$$\epsilon^{eff} = \frac{\Lambda}{4(1-\delta)}, \tag{A.25}$$

implying that this is a positive number in a domain of definition $\epsilon > 0$ when $0 < \delta < 1$ and $\Lambda > 0$. This shows that overall national output increases with differences in capital endowments for any $\epsilon < \epsilon^{eff}$, and decreases as ϵ increases above ϵ^{eff}.

Using (A.8), (A.9), and (A.19) with $\epsilon = \epsilon^{eff}$, we find that the second term of (A.14) representing the net return to capital equates to zero in the equilibrium. It means that each government has no incentives to manipulate capital price through their tax rates. If $\Lambda > 0$ and $\epsilon = 0$, country $H(L)$ behaves as a capital importer (exporter), which has an incentive to reduce (increase) capital price with higher (lower) tax rate. On the other hand, if $\Lambda = 0$ and $\epsilon > 0$, country $H(L)$ is a capital exporter (importer), which has the opposite incentive. These incentives cause a pecuniary externality, which distorts allocation of capital and leads to inefficient outcome. Hence, given a certain magnitude of agglomeration economies and technological asymmetry between the countries, there is a best value of asymmetry of capital endowment ϵ^{eff}, which can cancel out the distortion from the technological asymmetry. Moreover, the best value increases when capital agglomeration effects increase, because it enhances the effects of technological asymmetry and the distortion arose from it. Therefore, the results can be summarized as the following proposition.

Proposition *When $0 < \delta < 1$ and $\Lambda > 0$, the efficiency of capital allocation in the Nash equilibrium can be ameliorated as difference-in-capital-endowment increases for any $\epsilon < \epsilon^{eff} = \frac{\Lambda}{4(1-\delta)}$. In addition, the best value for the difference-in-capital endowment ϵ^{eff} is larger in the presence of agglomeration economies.*

A.5 Concluding Remarks

In this appendix, we extended the model of Fernandez (2005) and examined an asymmetric tax competition with agglomeration economies. We highlighted the finding that difference-in-capital-endowment can ameliorate the efficiency of capital allocation in the economy which is deteriorated by the asymmetry in technology and got even worse by the agglomeration economies. In the context of tax competition studies, two types of (in)efficiency commonly arises in the arguments, that is, public good provision and capital allocation. The former has been covered frequently in literature and some mechanisms have been suggested to solve the inefficient provision of local public goods. However, the latter has not been extensively analyzed, with mere indications that it does arise in a model of asymmetric tax competition. Our study focuses on agglomeration economies and their impact on the efficiency of capital allocation in a economy with asymmetry in technology and initial endowment. The results suggest that asymmetry in capital endowment can help improve the efficiency of capital allocation and there is a best value of it to cancel out the inefficiency, which is arose by the incentive to manipulate the terms of trade (capital price). With agglomeration economies, the inefficiency of capital allocation caused by asymmetry in technology is deteriorated. However, with larger difference-in-capital-endowment, it can be totally canceled out.

Chapter 6

Concluding Remarks

6.1 What We Focus

6.1.1 Politics in Globalization

Our main concern in this dissertation is how politics in each country is affected by globalization of the world we live today. No one and nothing can be isolated in the globalized world; many things are connected to each other in many ways. Governments and their policies are included in such things. In this sense, fiscal competition that regional governments compete for mobile production factor through their public policies captures the aspects of globalization. Particularly, we incorporate a political regime of representative democracy into a simple model of asymmetric fiscal competition, in order to see how the integration of capital market changes the election results in each country and how asymmetric results of elections can be linked to asymmetric factors characterizing the countries.

6.1.2 Two-stage Citizen-candidate Model

We mainly employ the two-stage citizen-candidate model; after an election to pick a policymaker is held in each country in the first stage, the policymakers simultaneously determine a regional public policy to attract mobile production factors into their countries. In this model, we assume that citizens in a country are heterogenous in initial capital endowment. Additionally, we assume that every citizen has a right to vote and run in the elections. Once a citizen is elected as a policymaker of that country, he/she can decides a public policy as he/she wants, that is, to maximize his/her utility; he/she does not care about social welfare of his/her country, next elections, or anything. Taking such policymakers' behavior into consideration, voters decide who they choose as their policymaker. With this setting, we can simply clear any kinds of social constraints and commitment problems out of the models, in order to see purely citizens' incentives in politics and their changes in the globalized world.

6.2 What We Find

We raised questions on politics in a globalized world today in Chapter 1 and provided a survey of the literature on fiscal competition with political approaches in Chapter 2. In Chapter 3 to Chapter 5, the main results and the essential mechanisms to determine who becomes the policymaker are derived. These are summarized as follows.

6.2.1 Overview of Chapters

Chapter 3

In Chapter 3, the basic model of asymmetric fiscal competition under representative democracy, which is applied and extended in the following chapters, is provided. The two countries in the economy, which are asymmetric in level of productive efficiency, are involved in tax competition for mobile capital between them. There exists the heterogeneity among citizens in a country about amount of initially endowed capital. Hence, difference in citizens' incentives reflected in their voting behavior is basically induced by difference in amount of endowed capital. As explained above, an election to pick a policymaker in each country is held in the first stage. Then, the policymaker in each country simultaneously decides capital tax rates in the second stage. Firms have to pay capital tax to their regional governments and the government in each country redistribute the tax revenue to their citizens in a lump-sum manner.

The main results in this chapter is as follows. When there is no asymmetry between the two countries, the policymakers are picked from the poor, which means people whose capital share is lower than that of the median in the distribution of capital endowment, in both countries. Even though its mechanism working behind the model is quite different, this result is the same with Persson and Tabellini (1992) and Ihori and Yang (2009). One of our key focuses is how we can connect the asymmetric economic factors and the asymmetric election results between the two countries. We find that the policymaker in country L, whose local firms have lower technology, is always relatively rich, compared to the policymaker in country H, whose local firms have higher technology. In addition, the gap of the policymakers' location in the distribution of capital endowment is expanded, when the asymmetry of the two countries becomes large.

Chapter 4

In Chapter 4, the policy instrument, which amount is determined by the policymaker elected through voting in each country, is changed from capital tax to public investment. The governments try to attract mobile capital by increasing their amount of public investment, which is able to augment productive efficiency of firms. We can easily imagine that local governments provide public investment as ports, air ports, roads, and high-speed networks for the internet,

among others, not only for increments of inhabitants' welfare in their jurisdictions, but also for attraction of capital investments to their jurisdictions. Hence, we change the policy instrument to attract capital and examine how the results of elections that we derived in Chapter 3 is affected, while the basic structure of the model is not changed so drastically.

However, the election results are changed drastically. When the two countries are symmetry, the policymaker is picked from the rich, which is defined as people whose capital share is higher than the median of the distributions of capital endowment. This result is a new finding in the literature of fiscal competition under representative democracy. Besides, when the two countries are asymmetric in the productive efficiency, the policymaker in country L is always relatively rich, compared to the policymaker in country L. Interestingly, this is also diametrically opposite result to that of what we derived in Chapter 3. The key factor to reverse the result is the strategic relations of policy instruments; while tax competition is a *strategic complement* game, public investment competition is a *strategic substitute* game. Its detail is explained below.

Chapter 5

In Chapter 5, we incorporate one more asymmetric factor, difference-in-capital-endowment, into the model of asymmetric tax competition under representative democracy, which we build and analyze in Chapter 3. We examine the effect of difference-in-capital-endowment to asymmetric result of elections in each country, asking whether it expands or closes the gap. In this model, we assume that country H with high technology is endowed with more amount of capital initially, compared to country L with low technology, as relative positions between the United States and Japan or between Japan and South Korea.

First, we examine only the effect of difference-in-capital-endowment to election results, without any other asymmetry between the two countries. As a result, the policymaker in country H with more capital endowment is relatively rich, compared to the policymaker in country L with less capital endowment. Second, we find that the effect of difference-in-capital endowment closes the gap of policymakers' location which is caused by asymmetry in productive efficiency. Simply, it is because that the effects of terms-of-trade work in the direction to cancel out each other: If a country has higher(lower) technology compared to the other, it makes the country a capital importer(exporter). On the other hand, if a country has more(less) amount of capital compared to the other, it makes the country a capital exporter(importer). The terms-of-trade effects are crucial factor to determine the locations of policymakers in each country, as explained in detail below.

6.2.2 Structural Feature and Essential Determinants

All through the studies in Chapter 3 to 5, the key mechanisms to determine the location of policymakers in the distribution of capital endowment are common. The significant factors are twofold: advantage of voters due to structural fea-

ture of the two-stage models and several kinds of terms-of-trade effects due to incentive to control the price of capital in the market. These two factors are explained one by one as follows.

Advantage of Voters

The basic structure of the models is two-stage game; after a policymaker is elected through voting by citizens in each country in the first stage, the policymakers simultaneously determine public policy in their countries in the second stage. Hence, voters can take advantage of this two-stage game; while policymakers have to determine public policy after elections, voters can determine who they vote on before elections. It implies that voters can foresee which candidate reacts how against public policies of rivalry country. From the view point of economic theory, the choice of policymakers is actually the choice of reaction curves of that country. Voters, particularly, the decisive median voters, choose reaction curves to maximize his/her utility, taking a reaction curves of the rivalry country as given.

When countries are closed, or when the capital market is not integrated and endowed capital in each country is not mobile, voters do not have any incentives to delegate the authority to set an amount of public policy in that country to other citizen. It is just because that every citizen wants to decide public policy as he/she wants. Hence, if an election is held in a closed country with the assumption of all-citizen-candidate, every voter would vote for himself/herself and the median voter would become the policymaker as a result. This fits our intuition.

However, once the countries are open, or once the capital market is integrated, the median voters have incentives to delegate the authority to other citizens as the results we derived. This is because that strategic relations between public policies of the two countries arise due to the integration and mobility of capital; when a public policy to attract capital is changed in one country, it affects not only capital amount of the country, but also that of rivalry country and capital price in the market which firms and citizens in the rivalry country confront. Therefore, in this case, each voter has an incentive to delegate the authority to other citizen, not himself/herself, to influence the policymaking in the other country through the strategic relations of public policies, so as to increase his/her utility. This is the reason why the strategic relations, whether *strategic complements* or *strategic substitute*, are crucially matters to determine voting behaviors of citizens and the policymakers in the equilibrium.

Terms-of-trade Effects

In this framework, citizens, particularly the median voters, can obtain higher utility by controlling the price of capital in the market. Whether the price should be higher or lower to increase his/her utility depends on whether he/she is a capital importer or capital exporter at a personal level. When a citizen compares amount of capital initially endowed and capital per capita employed

firms in his/her country, he/she is defined as a capital importer(exporter) if the latter is more(less) than the former. Therefore, if he/she is positioned as a capital importer(exporter), he has an incentive to lower(heighten) the price of capital in the market through his/her voting behavior. We define this effect as the terms-of-trade effect through this dissertation. Besides, we classified several effects to two types of terms-of-trade effects, *inter*-terms-of-trade effect and *intra*-terms-of-trade effect. The former effect is due to the position of the median of the distribution of capital endowment within a country. On the other hand, the latter effect is due to asymmetric factors between the two countries. To facilitate understanding of voting behavior affected terms-of-trade effects, we sort out the determinants shown in previous chapters as follows.

- **Skewness of the Distribution** (*inter*-terms-of-trade effect)
  If the two countries are symmetric in all factors, the comparison of capital amounts between ex ante and ex post for the median voters becomes comparison of capital between amount of the median and the average of the distribution of capital endowment. As long as we assume the shape of the distribution is positively skewed as we observe in the real world, the median voter becomes a capital importer and has an incentive to lower the price of capital in the market.

- **Productive Efficiency** (*intra*-terms-of-trade effect)
  Asymmetry in productive efficiency divides the two countries into a capital-importing country and a capital-exporting country; a country with relatively high technology becomes a capital-importing country, while a country with relatively low technology becomes a capital-exporting country. This is because that the difference in return to capital between the two countries arises due to the difference in the productive efficiency.

- **Capital Endowment** (*intra*-terms-of-trade effect)
  Asymmetry in capital endowment also divides the two countries into a capital-importing country and a capital-exporting country; a country with more capital endowment becomes a capital-exporting country, while a country with less capital endowment becomes a capital-importing country.

- **Median Voters' Location** (*intra*-terms-of-trade effect)
  Although this factor is not examined in this dissertation explicitly, we can capture it when we do not put the assumption of symmetry of the median voters' location in the distribution of capital endowment, that is, $\theta_{HM} = \theta_{LM} = \theta_M$, in the analysis.[1] If the median in one country is located at a point to the left side of that in the other country, it implies that the country is likely to be a more redistributive government because the majority of citizen in the country is relatively poor, compared to the other. Therefore, the country becomes a high-tax country and capital outflow from the country, which means that the country

[1] In Persson and Tabellini (1992), the asymmetric factor between two countries is this.

becomes a capital-exporting country and the other country becomes a capital-importing country.

As a result of mixing these four factors, whether the decisive median voter in a country is a capital importer or a capital exporter is determined.

In tax competition models as analysis in Chapter 3 and 5, the median voter delegates the authority to the poor(rich) if he/she is a capital importer(exporter). In this case, his/her voting behavior is interpreted in three steps as follows: i) When he/she delegates to the poor(rich), the tax rate in his/her country increases(decreases) because a poor(rich) policymaker is likely(unlikely) to implement more redistributive policy, compared to a rich(poor) policymaker. ii) When the tax rate in the country increases(decreases), the tax rate in the rivalry country also increases(decreases). This is because the strategic relation of public policy in tax competition is *strategic complement*. iii) When the tax rate in the rivalry country increases(decreases), the price of capital in the market decreases(increases). Therefore, the median voter as a capital importer(exporter) can obtain higher utility from decreased(increased) price of capital.

On the other hand, in public investment competition model as Chapter 4, the median voter delegates the authority to the rich(poor) if he/she is a capital importer(exporter). In this case, his/her voting behavior is interpreted in three steps as follows: i) When he/she delegates to the rich(poor), the amount of public investment in his/her country increases(decreases) because a rich(poor) policymaker is more(less) likely to obtain high return from capital, so he/she has an incentive to increase(decrease) the capital price by doing more(less) public investment, compared to a poor(rich) policymaker. ii) When the amount of public investment in the country increases(decreases), the amount of public investment in the rivalry country decreases(increases). This is because the strategic relation of public policy in public investment competition is *strategic substitute*. iii) When the amount of public investment is the rivalry country decreases(increases), the price of capital in the market decreases(increases). Therefore, the median voter as a capital importer(exporter) can obtain higher utility from decreased(increased) price of capital.

These are the main results and their interpretations in this dissertation.

6.3 Limitation and Future Research

In order to obtain clear-cut results and their implications, we set several assumptions in our models. Therefore, in conclusion, we point them out as subjects to be examined in future.

6.3.1 Specification of Formulas

One of the biggest assumptions we set in analysis of this dissertation paper is specification of functions, particularly, utility functions. The utility functions are basically assumed to be linear, which implies that a level of total income of

an individual directly tells a level of his/her utility. Additionally, there do not exist public goods, only a single kind of private goods. In the tax competition models in Chapter 3 and 5, the government in each country levies tax on capital employed by firms in their country and gain the tax revenue. They, the governments, do not expend it to provide any public goods, but just redistribute it in a lump-sum manner. In the public investment competition model in Chapter 4, the government in each country provide a certain amount of public investment so as to attract capital in their country. In this case, every citizen in the country is burdened with the expenditure of public investment, here again, in a lump-sum manner; the burden is not graduated in accordance with their basic income from wage and return from capital. Somewhat different results can be derived with somewhat different forms of public finance in each country.

Besides, coefficients in the specified formulas might be problematic, particularly, the coefficient in the cost functions of public investment in Chapter 4. As mentioned above, the key concept to derive the diametrically opposite results in Chapter 3 and Chapter 4 is strategic relations between public policies of the two countries; it is *strategic complements* in the tax competition model in Chapter 3, while it is *strategic substitute* in the public investment competition model in Chapter 4. These strategic relations play a key role as the determinants of voting behavior of citizens. Even though we assume that the coefficient of marginal cost for public investment is $1/2$, that is, the marginal cost in country i is $G_i/2$, and it clearly shows that strategic relations of public investment between the two countries is *strategic substitute*, this can be *strategic complement* when we set a coefficient of marginal cost for public investment to be sufficiently low, as $1/4$ or below in that formulation of cost function.

6.3.2 No Interventions of Rules or Other Governments

In the models in this dissertation paper, there is no systems or organizations that connect the two countries. In other words, there do not exist rules as fiscal transfers from one country to the other, or interventions of superior-level government as central government. These countries are connected only through the integrated capital market and perfectly mobile capital. As we can observe in the real world, we should take these factors into consideration and see how they affect results of elections in each country.

Additionally, even in horizontal level, we limit the number of countries or regions involved in fiscal competition as two. The number of countries in economy might also affect results of elections.

6.3.3 Timing of the Games

In all of the models, the timing of the game is exogenously given; after an election to pick a policymaker is held in each country in the first stage, the policymaker determines public policy, capital tax rate in Chapter 3 and 5 or amount of public investment in Chapter 4, in each country in the second stage. We assume that the timings of the election and fiscal competition are simultaneous in

each stage, not sequential or endogeneously determined. It is worth examining these framework in sequential game and endogenizing timing of elections and determination of public policy as strategic factors.

6.3.4 Who Becomes the Candidates?

We use the all-citizen-candidate model through this dissertation paper. As the name suggests, it means that candidates in election are all citizens living in that country. Even though this setting is useful when we focus on pure incentives of citizens' voting behaviors without any constraints, it can be said unrealistic setting. In reality, every citizen does not run in elections, or we should say, can not run in elections, because there are many types of constrains to be a candidate as deposit money. It is also worth considering how such constraints for running in elections are institutionalized in our society.

These remain for future research.

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