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研究成果の概要

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I conducted the following five studies.

The first study considers a cross-country difference in age gap in voter turnout and its impact on fiscal policymaking in a multi-country, overlapping-generations model. This study is the collaborative research with Tetsuo Ono (Osaka University) and formally circulated under the title "Age gap in voter turnout and size of government debt" (*International Tax and Public Finance,* Vol.27, pp.435-460).

The Organization for Economic Co-operation and Development (OECD) reports that on average the voter turnout rate for young people is 20 points lower than that of individuals aged 65 years and above. This pattern is expected to compel politicians to shift fiscal obligations to the younger generation by increasing debt, but the OECD data do not indicate a positive correlation between the debt-to-GDP ratio and the age gap in voter turnout. The purpose of this study is to provide a simple dynamic politico-economic model, which explains the non-monotonic relationships observed in OECD countries.

For the purpose of this analysis, we propose a dynamic politico-economic model of public debt. We focus on the cross-country differences in the rates of abstention from voting. For simplicity, we assume that voter turnout rates are exogenous. However, the rates differ between the young and old, and also among countries. In addition, we adopt the utility function with a constant inter-temporal elasticity of substitution, which enables us to evaluate the impact of voter turnout rates on fiscal policy more comprehensively.

Within this framework, we consider an increased turnout rate (i.e., a lower abstention rate) of the old. A higher turnout rate of the old is associated with a larger weight on the old in the political objective. This induces the government to respond more strongly to the demand of the retired old. Given that the retired old do not have the burden of labor income tax but benefit from public goods, the government responds to the request from the old by raising the tax rate and issuing more public bonds. Therefore, a larger age gap in voter turnout works to increase the provision of public goods and thus raise the tax and public debt burdens on the working young. Higher provision of public goods today makes the young prefer higher public goods in their old age because they want to smooth consumption of public goods over their life cycle. The government responds to this demand of the young by restraining the issue of public bonds and compensates for the loss of revenue by raising the tax rate. This in turn lowers debt repayment costs, increases the budget in the next period, and thereby enables the

government to increase provision of public goods in the next period. Therefore, a higher voter turnout of the old increases the tax rate, while it creates two opposing effects on public bond issues.

We show that the negative effect on public bond issues depends on the magnitude of the inter-temporal elasticity of substitution of public goods. A lower elasticity implies less demand for future public goods provision by the young. In other words, the government is less inclined to control public bond issues as elasticity decreases. Our analysis shows that there is a critical value of elasticity, such that the negative effect of the voter turnout rate of the old on public bond issues is outweighed by its positive effect when elasticity is below the critical value. In addition, the analysis shows that there is another critical value of elasticity such that the negative effect outweighs the positive effect. Furthermore, the two opposing effects balance each other at some voter turnout rate of the old when elasticity lies between the two critical values. This case could be viewed as representing the non-monotonic relationship between the age gap in voter turnout and debt-to-GDP ratio.

The second study examines the relationship between productive government expenditure and economic growth. This study is the collaborative research with Takeo Hori (Tokyo Institute of Technology) and Kazuo Mino (Kyoto University), and it was formally circulated under the title "Productive government expenditure and economic growth in a heterogeneous-agents model" (Faculty of Economics, Doshisha University, Working Paper Series No. 54).

Does government expenditure size affect long-term growth? What is the optimal government spending level that maximizes growth? Economists have long been discussing these questions through substantial amount of accumulated research. Some studies have theoretically examined the relationship between government expenditure size and economic growth and demonstrated the possibility of an inverted U-shaped relationship between the size of government expenditure and economic growth. Greater government expenditure means a larger input in the final-good production that incentivizes private investment. However, larger government expenditure also means a higher tax rate, which lowers the net return to private capital, thus reducing private investment. When the size of government expenditure is initially small, the first positive effect dominates the second negative effect. On contrary, when high, the second effect dominates the first one.

Numerous studies have empirically examined the relationship between government expenditure size and economic growth based on the above theoretical results. However, these empirical studies have not reached a broad consensus. Some studies find a positive relationship between government expenditure size and economic growth, whereas others find

a negative relationship. These disparate results comport with the theoretical prediction of either a positive or negative relationship between government size and growth. Interestingly, however, an ambiguous relationship is also reported in several studies. Thus, the theoretical challenge is to construct a model that can explain the positive, negative, and ambiguous relationships between government size and economic growth in a single setting. This paper aims to present such an analytical framework to eliminate discrepancies between theoretical and empirical studies.

We construct this analytical framework based on the endogenous growth model. In the model, R&D activities that increase various intermediate goods drive long-term growth. The final good is produced using a continuum of intermediate goods and productive government spending financed contemporaneously by a flat-rate capital income tax. We assume that agents have heterogeneous R&D ability, with an endogenously determined cutoff level. Agents whose abilities are below the cutoff disregard innovation and become workers.

Similar to the previous studies, a change in government spending has two opposing effects on economic growth in our model. First, high government expenditure increases monopolistic profits and thus stimulates entry of intermediate-good firms, indicating a positive effect on long-term growth rate. Second, high government spending indicates a high tax rate, depressing the net benefit of R&D and indicating a negative effect on long-term growth rate. Therefore, our model generates an inverted U-shaped relationship between government expenditure/GDP ratio (government size) and economic growth. Moreover, the inverted U-shaped relationship holds regardless of the presence or absence of heterogeneity in ability.

Then, how do heterogeneous abilities affect the relationship between government size and economic growth? The inverted U-shaped curve has a flat top in the presence of heterogeneity. The flat top illustrates that a change in government size has a limited impact on growth. This result suggests that heterogeneity may be a source of an ambiguous relationship between government size and long-term economic growth. We analytically derive the inverted U-shaped curve with a flat top. Thus, heterogeneity's ability to generate a flat top or an ambiguous relationship can be easily explained.

If we assume that agents are homogeneous, then government expenditure's positive or negative impact uniformly affects R&D incentives. As a result, government size and economic growth have a normal inverted U-shaped relationship. If agents have heterogeneous R&D ability, then government expenditure size non-uniformly affects their occupational choice. When government expenditure/GDP ratio is sufficiently low or high, R&D's net benefit is small, with only high-ability agents becoming entrepreneurs. Thus, cutoff level changes affect high-ability agents' occupational choice. Given that this impact is relatively large, a change in government size significantly impacts economic growth. In contrast, when government

expenditure/GDP ratio is moderate, a change government size generates occupational changes for low-ability agents. Hence, the impact on economic growth is small. Therefore, an inverted U-shaped curve with a flat top depicts the relationship between government size and economic growth rate in the case of heterogeneous-ability agents. This flat top explains the positive, negative, and ambiguous relationships between government expenditure/GDP ratio and economic growth rate.

We also calibrate the model to U.S. data and empirically confirm our analysis. Assuming that entrepreneurial ability follows a truncated Pareto distribution, our simulation performs an inverted U-shaped relationship with a flat top between government expenditure/GDP ratio and economic growth rate under plausible parameter values. An ambiguous relationship exists if government expenditure/GDP ratio is approximately between 2% and 20%. However, long-term growth rate significantly increases or decreases when government expenditure/GDP ratio is outside this range. The U.S. average general government final consumption expenditure (% of GDP) is approximately 15%. Thus, our numerical example suggests that the U.S. economy is on the flat top of the inverted U-shaped curve. Furthermore, a small government size change is unimportant to the U.S. economy from the economic growth perspective.

Our theoretical and numerical results provide a new perspective of optimal government size. The result shows that the correlation between government expenditure/GDP ratio and economic growth rate in the heterogeneous-ability economy is not prominent when government expenditure/GDP ratio is moderate. This finding implies that the debate about government size is not significant to economic growth rate unless government size is extremely large or small.

The third study considers the international coordination of debt rules in an economy consisting of a large number of countries with varying degrees of present bias. This study is the collaborative research with Tetsuo Ono (Osaka University) and formally circulated under the title "International coordination of debt rules with time-inconsistent voters" (Faculty of Economics, Doshisha University, Working Paper Series No. 56).

Since the European debt crisis of late 2009, there has been increasing attention to the sustainability of public debt in developed countries. In today's highly integrated world economy, a fiscal crisis in one country could have a ripple effect on other countries. For example, the Greek debt crisis impacted other sovereign bond prices and reduced the financial value of European firms. In the wake of the financial and economic crisis, the EU has placed even greater emphasis on maintaining fiscal discipline in the region and has strictly enforced common fiscal rules to be followed by EU member states.

Having a common set of fiscal rules for several countries, such as the EU, is more enforceable in terms of adherence to the rules than if each country has its own fiscal rules. For example, the EU invokes the excessive deficit procedure (EDP) for countries that significantly deviate from the common fiscal rules of the member states, placing the country's finances under EU supervision and in some cases imposing fines. The presence of such external sanctions increases the incentive for countries to comply with the rules and makes the fiscal rules more effective.

However, common fiscal rules are not always followed. The financial crisis of early 2010, for example, was caused by the incoming Greek government's revelation that the budget deficit reported in 2009 was underestimated. This suggests that Greece may not have followed the EU's rule of keeping the budget deficit within 3 percent of GDP. Italy was also pointed out by the EU in 2019 for its failure to comply with the rule mentioned above (European Commission, 2019). Although the EDP was not triggered in either case, these cases illustrate the difficulty in getting all the member countries to comply with the common rules.

In this background, this study addresses the following three questions: 1. Which common fiscal rule is optimal under the possibility of violation of the rule? 2. Which countries would benefit (or lose) from the introduction of a common fiscal rule? 3. Would a common fiscal rule improve fiscal discipline in all participating countries? To answer these questions, this study provides a theoretical analysis using a political economy model.

In considering the role of debt rules, this study focuses on time-inconsistent decision-making arising from households' present-biased preferences. Households with present-biased preferences have the incentive to consume more in the present compared to their previous consumption plans, which they previously considered optimal. When such households choose a fiscal policy through voting, they choose a policy of increasing bond issuance. To control the excessive issuance of government bonds through household voting behavior, it is necessary to introduce rules to cap the issuance of government bonds. Within this framework, this study evaluats the effectiveness of coordinated debt rules, such as those introduced in the EU, by conducting a comparative analysis of the case where each country sets its own rules versus a common set of fiscal rules for all countries within an economic area.

We show that whether a tighter debt ceiling is achieved under a coordinated or uncoordinated rule depends on the degree of present bias in each country. Our analysis implies that the ceiling on government bond issuance under the coordinated rule is tighter for countries with strong present-biased preferences and looser for countries with weak present-biased preferences. Our analysis also indicates that a uniform imposition of coordinated fiscal rules on all countries is not necessarily desirable, since the impacts of rule changes on the volume of government debt issuance and social welfare of each country depend on its degree

of present bias and thus vary from country to country. Therefore, our results suggest that the degree of present bias in each country should be considered when implementing internationally coordinated debt rules.

The fourth study examines a political game in which a policymaker pledges a domestic emissions goal in the context of the choice of an instrument between carbon pricing and a quota approach. This study is the collaborative research with Hiroaki Yamagami (Seikei University) and Takeo Hori (Tokyo Institute of Technology), and it was formally circulated under the title "Ambitious emissions goal as a strategic preemption" (*Strategic Behavior and the Environment*, forthcoming).

The Paris Agreement suggests two targets: (1) keeping the global temperature rise in this century well below 2 degrees Celsius and (2) pursuing efforts to limit the temperature increase even further to 1.5 degrees Celsius. The Paris agreement allows the contracting parties to set their own emissions goals. Then, the double-standard goals may incentivize the contracting parties to aim for the easier goal (1). Against this conjecture, ambitious groups of countries and cities have appeared.

To investigate why some countries are so ambitious, we model a political game in which a policymaker pledges a domestic emissions goal in the context of the choice of an instrument between carbon pricing and a quota approach. We show that, although the policymaker faces an emissions goal proposed from an international environmental agreement, he/she may pledge a more stringent goal than the proposed level. We find that when the industry's lobbying cost on the choice of an instrument is small enough, the policymaker pledges the ambitious emissions goal for a certain range of the proposed goals. The ambitious emissions goal then preempts the lobby on the choice of an instrument and decreases the social cost compared to a case where the domestic emissions goal is as much as the one proposed in the IEA.

The fifth study considers how present-biased preferences influence public debt policy when a violation of debt rules is possible. This study is the collaborative research with Tetsuo Ono (Osaka University) and formally circulated under the title "Public debt rule breaking by time-inconsistent voters" (*European Journal of Political Economy*, forthcoming).

In the last decade, many developed countries have experienced large budget deficits and rapidly growing public debt. This raises concerns about the sustainability of public finances and highlights the need for fiscal rules in achieving fiscal consolidation. Fiscal rules are expected to constrain the behavior of governments, but the enforceability of these rules is questionable. For example, the United Kingdom adopted two fiscal rules in 1997: (1) the

budget deficit may only finance public investment and (2) the debt-to-GDP ratio may not exceed 40 percent. However, while the rules were met for a few years, slippage set in after 2002. In the euro area, the Maastricht treaty specifies that budget deficits cannot exceed three percent, but this rule was satisfied only 60 percent of the time in the first thirteen years of the existence of euro. The evidence suggests that, in practice, the conditions required for fiscal institutions are rarely met.

To investigate why fiscal rule violations occur so frequently, we focuses on time-inconsistent, present-biased preferences. When agents are endowed with such preferences, they change their ex-ante consumption plans, choosing to consume more in the present and less in the future. In particular, they are incentivized to support, via voting, a large public debt issue; this enables them to obtain a great deal of resources for consumption today through transfers financed by the debt issuance. To address this issue, the study extends the framework of Bisin, Lizzeri, and Yariv (American Economic Review 105, (2015), pp. 1711-1737) by allowing for rule breaking with extra costs; we show that rule breaking occurs when a country exhibits a strong present bias. We further extend the model by introducing a political process for determining the debt rule, and we show that a polarization of debt rules emerges between countries with high and low degrees of present bias.