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Economic Growth and Fiscal Policy

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Role of Fiscal Policy in Economic Growth

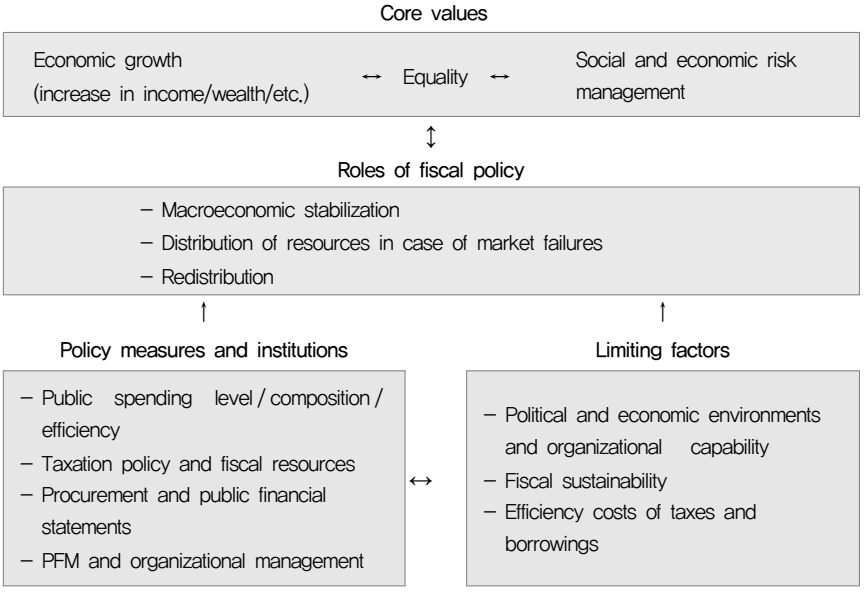
The state utilizes a variety of policy measures to impact diverse aspects and levels of the national economy. Fiscal policy, which is perhaps the most important of all government policies and henceforth garners much attention, is comprised of a combination of spending and taxation programs implemented by the state to shape and affect the given national economy. The ways in which fiscal policy impacts the economy can be indeed myriad and complex, involving innumerable variables and correlations. It is, however, crucial for policymakers to understand as much of these complex correlations as possible in making fiscal decisions.

During the so-called period of "Great Moderation," leading up to the onset of the global financial crisis in 2008, monetary policy was regarded worldwide as the more effective policy instrument for managing business cycles, while fiscal policy was seen more as an instrument of mid- to long-term economic growth. The spread of the global financial crisis, which originated in the United States, worldwide, since 2008, however, shattered the pervasive consensus on the proper timing and use of fiscal and monetary policies, forcing numerous governments around the world to introduce stimulus packages of massive scopes. This radical turn toward the fiscal has so far been received favorably by the public and academia alike. Moreover, it has also prompted researchers to formulate new and fresh perspectives on the analysis of fiscal policies and their impact.

The purpose of this study is to explore this recent fiscal trend and its role in the traditional framework of government policymaking. We examine how

the new and diverse phenomena that have been occurring worldwide since the onset of the global financial crisis affect our understanding of fiscal policy, and also analyze the different fiscal policy measures that have been employed, and how they correlate to policy goals.

[Figure I-1] System of Fiscal Policy Goals



Source: Brahmbhatt and Canuto (2012)

1 Policy goals and the role of fiscal policy

In general, we think of the main aims of fiscal policy as the following: to stabilize macroeconomic settings; to improve the distribution of fiscal resources; and to counter and regulate distributive inequality (Musgrave 1959). Brahmbhatt and Canuto (2012) summarize fiscal policy governmental systems as shown in [Figure I-1], arguing that through fiscal policy the government of

a given state promotes continued economic growth, improves social equality through redistribution, and manages social and economic risk factors by stabilizing macroeconomic conditions.

A. Macroeconomic stabilization

The state employs both short- and long-term fiscal policy measures to promote macroeconomic stability. In the short run, macroeconomic stabilization refers to reducing the margins of fluctuations in business cycles. Prior to the global financial crisis, fiscal policy was considered an instrument of mid- to long-term economic growth only. In recent years, however, policymakers have come to realize the great impact that fiscal policy can exert on macroeconomic environments even in the short run.

There are largely two channels via which short-term fiscal coordination affects the business cycle. First, the state may improve the fiscal situation and reduce fiscal risks so as to affect market assessments. Second, the state may adopt the more traditional approach of stimulating total demand. This latter approach is increasingly emerging as a controversial topic, related as it is with the growing debate on the short-term effectiveness of fiscal policy measures and the controversy over the sizes of fiscal multipliers. With growing interest in how fiscal policy has helped to turn the tide of the global financial crisis—contrasting the previous assumptions—and how fiscal adjustments intended to restore fiscal stability are affecting macroeconomic settings, researchers and policymakers worldwide are debating the proper policy measures needed to help various states overcome their current ruts of slow growth.

Not only does fiscal policy affect economic settings, but economic settings also affect fiscal situations by way of automatic stabilizers and so forth. Considering this feedback effect, the economic impact of fiscal policy may pan out more abruptly or deteriorate depending on the situation.

Aside from affecting the levels of macroeconomic indicators, fiscal policy measures can also variously affect short-term volatility. Empirical analyses on economic growth in general point out the inverse correlation between the economic growth rate and the volatility of growth.[1] Now that various states worldwide are adopting “growth-friendly” policy measures to escape the current

pattern of slow economic growth triggered by the global financial crisis, we need to review in depth how these measures will affect economic volatility in the short run.

Economic volatility refers to the way in which a given economy reacts to external shocks, and includes a number of related issues. The role of the financial market, for instance, is receiving increasing attention these days for its possible role in determining how vulnerable an economy is to external shocks, and the degree of extremeness it shows in its reaction to such shocks. Although the capital market served as the epicenter of the recent global financial crisis, it is still believed to harbor great resources to stimulate economic growth in the long run.[2] However, the advancement of the financial market may also increase the susceptibility of the overall economy. In the interest of economic efficiency, we need sufficient regulations that can effectively rein in the increasing susceptibility of the economy, in addition to policy measures that specifically respond to changes and fluctuations in financial and asset markets[3]. We need also to consider the impact that policy measures exert on the way in which external shocks spread throughout the given economy. Although measures that promote macroeconomic stability and long-term economic growth do help the economy absorb and manage external shocks, some measures do indeed backfire.

In the long run, macroeconomic stability may indicate economic growth or improvements in the potential growth rate. Alternatively, it may involve mitigating fiscal uncertainty by enhancing the sustainability of fiscal circumstances.[4] As for the impact on the potential economic growth rate, certain macroeconomic policy measures may increase the level of debts in the long term, thus undermining the potential of the given economy to grow. The controversy raised by Reinhart and Rogoff (2010) may have served to increase

1) Ramey and Ramey (1995)

2) Schularick and Taylor (2012)

3) For instance, fiscal measures that anticipate additional tax revenue from bubbles in the asset market may ultimately render the fiscal system all the more vulnerable. It is necessary to find policy responses that can counter and prevent these structural shortcomings

4) Koh (2008), and Brahmbhatt and Canuto (2012)

the public's interest in this matter, but the general consensus is that too high a level of debt ultimately compromises the growth potential of an economy.[5)]

On the microeconomic plane, fiscal policy affects economic growth by shaping the ways in which the public sector plays its role in the given economy. The overall tax burden level, taxation methods, and fiscal spending program execution, among others, form the overall economic incentive system, inducing or reducing investment, employment, economic efficiency, and economic growth overall.

Of course, microeconomic measures intended to maximize economic efficiency may contradict the principle of distributive equity. In choosing one fiscal policy measure over another, policymakers therefore need to consider how the outcome of the chosen measure would affect other goals and values of fiscal policy.

B. Improvement of the distribution of fiscal resources

The improvement of the distribution of fiscal resources involves the state inducing a certain distribution of fiscal resources that corrects or prevents market failures so as to enhance the technical and distributive efficiency of the overall economy and thereby promote its potential for mid- to long-term growth. The possible fiscal policy measures that the state may adopt to this end include: developing and providing public goods; making changes to the incentive system by introducing new taxes or grants that account for externalities; and developing the social infrastructure and grounds upon which individual economic actors can engage fairly and actively in market activities. Examples of such "grounds" include the rule of law and general reinforcement of the legal system. Koh (2008) lists five traditional economic roles of the government, namely, the protection of private property, the correction of market failures, the provision of merit goods, the redistribution of income and wealth, and macroeconomic stabilization. Koh groups the first two－the protection of private property and the correction

5) Kumar and Woo (2010), Cecchetti et al. (2011), and Baum et al. (2012)

of market failures－with the fiscal resource distribution improvement conceptualized by Musgrave (1959). The belief is that the assurance of the protection of private property under a well-ordered and functioning system of law and order encourages individuals to engage in protective activities. The collection of these activities of individuals, in turn, leads to economic development.

The concept of market failure forms the main pillar of economic arguments that favor active market intervention by the state. There is a wide range of causes for market failures. Without proper and timely intervention from the outside, the optimal distribution of resources in the failed market will fail to serve the overall society and its progress. For example, the provision of public goods, such as national defense, safety and security services, roads and bridges, and the like, are crucial to the improvement of the overall productivity of the given economy. In the meantime, mitigating or preventing negative externalities, such as pollution, and promoting and subsidizing positive ones, like research and development and education, are also key economic roles of the state. The government also has important roles to play in mitigating the possible consequences of the asymmetry of knowledge in such economic activities as guarantees, loans, and credits, and also in solving the problem of the missing market with respect to insurances for countering uncertainties and the like.

The key issue in recent debates on fiscal resource distribution focuses on which reforms should be pursued in terms of the structures of public investment and spending as well as of taxation. In the aftermath of the global financial crisis, the majority of member states of the Organization for Economic Cooperation and Development (OECD) made a turn at increasing government investment as part of their stimulus packages. With more and more states seeking to restore fiscal stability, however, the level of public investment and spending has been declining somewhat in recent years. As researchers and analysts continue to lower their expectations for the speed of market recovery, the International Monetary Fund (IMF, 2014) has pointed to declining public investment in social overhead capital as a main cause for the slowness of economic recovery.[6)]

Those who argue for increases in public investment cite the short- and long-term benefits of public investment and spending, the need to expand social

overhead capital, and the extremely low interest rate in the market today. Those who oppose point to the many spheres of uncertainty involved: in the current fiscal situation, in the fiscal multipliers involved in public investment and spending, and in the possibility of any returns on long-term investment in public capital goods. Given the fundamental problem of inefficiency in public investment, as illustrated by the experiences of Japan and other countries, increasing public investment and spending may not be the only or the best means to stimulate economic growth.[7)]

As for reform of the taxation structure, we need to take into account a number of equally important, yet possibly conflicting, goals, including: the need to ensure equity in the changed distribution of tax burdens; the need to promote mid- to long-term economic growth by enhancing the efficiency of taxation; and the need to secure stable sources of fiscal resources and tax revenue capable of accommodating mid- to long-term, structural fiscal spending needs. Sutherland et al. (2012) list property taxes, environmental taxes, and various public service charges and fees as top-priority targets of tax reforms. First, though property and transaction taxes may not involve high costs in cases of allocative inefficiency, they can nevertheless be the subjects of thorny political controversies. Policymakers therefore can significantly improve the efficiency of the overall tax system by eliminating or reducing other distortive taxes and reinforcing the property tax simultaneously. Environmental taxes, in the meantime, provide an excellent instrument with which policymakers can increase tax revenue and correct negative externalities at once.[8)] Additionally, the authors also point out that public service fees, urban traffic charges, water fees, and the like can also be employed as appropriate policy means to keep excess demand in control and raise fiscal revenue.

6) Much of the public capital stock, acquired by public investment, is concentrated in social overhead capital or infrastructure. There is a strong correlation between the two (IMF, 2014)

7) Warner (2014)

8) However, unless the increase in the environmental tax does not accompany decreases in other inefficient taxes, the increase in the overall tax burden may limit the growth of the overall economy.

C. Equity of redistribution

The free activities of individual economic actors in the market may result in a distribution of resources, wealth, and income that dramatically contradicts the ideals of equality and fairness in the given society, increasing the likelihood of diverse social risks. In today's world where it is believed that the central role of the government is to guarantee minimum or basic living for all citizens, the alleviation of poverty, social integration, and economic equity have become issues as pressing as economic growth. A number of states worldwide have adopted and continue to hone various tax and spending policy measures in order to reduce distributive inequality.

The recent global financial crisis hit the low-income class especially hard, widening as it has wealth and income gaps around the world. Massive stimulus packages and the ensuing fiscal stabilization measures have rendered the growing problem of economic inequality even more acute. As researchers and policymakers debate which strategies would be most effective for minimizing the byproducts of fiscal stabilization measures on economic growth, worries over how measures to promote economic growth might further worsen the inequality problem have escalated. Matters of redistribution and equality have thus further complicated the problem of selecting the right fiscal adjustment measures in the post-global financial crisis world.

2 Means to fiscal goals and their limits

Once the legitimacy of the state's intervention in the market is established and the goals of fiscal policy measures determined, the measures themselves should be clarified in consideration of diverse factors that include whether to use spending or taxation; how the selected option will affect the government's balance sheet; which department or agency is to handle execution and in what modes or methods, etc.

The two main ways a state intervenes in the economy are by deciding the total amounts and the respective ratios of government spending and revenue. As for the total amounts, the state needs to decide how much its spending and

revenue will shape macroeconomic settings, impose tax burdens on the economy, and impact the potential economic growth rate in the long run. In general, states that are already imposing high taxes, like the member states of the European Union (EU), are likely to hurt the long-term prospects of their economic growth if they attempt to increase tax revenue for fiscal stabilization. They therefore need and tend to adopt revenue-neutral or revenue-reducing measures as part of their tax adjustments and reforms. If the tax rate in a given state is not that high, however, the government may need to consider introducing higher tax rates alongside greater spending as part of major fiscal reforms.[9)]

Given the recent trend in fiscal reforms worldwide, rather than adopting across-the-board cuts, governments need to undertake spending reviews and clarify which of the current spending programs are effective (and therefore to stay) and which ought to go.[10)] The composition of government spending reflects the diverse roles that the government is supposed to play in a given society, and is subject to the influence of multiple factors, including such socioeconomic ones as economic and demographic structures, as well as the institutional settings of the public sector. It is therefore natural that the makeup of government spending differs from country to country, and we cannot use the inclusion or exclusion of one type of spending program and not another in the makeup of a given country's government spending as the sole basis for assessing the efficiency or appropriateness of that makeup. Nevertheless, given the recent trend in spending worldwide, numerous states do need to conduct in-depth spending reviews[11)].

9) Baldacci et al. (2012)

10) The term "spending review" may be used as a proper noun (with the first letter of each word capitalized) referring to the mid-term fiscal plans that the British Parliament regularly produces. In general, however, the concept refers to the periodical and as-needed in-depth review of government spending, with such examples as the Comprehensive Spending Review of the United Kingdom, the In-Depth Review of South Korea, and the Strategic Review of Canada. Robinson (2013) defines it as "the process of developing and adopting savings measures, based on the systematic scrutiny of baseline expenditure." In the aftermath of the latest global financial crisis, increasingly more OECD member states have been adopting similar programs

11) Cottarelli and Jaramillo (2012) find manifest upward patterns in recent spending on such programs as subsidies and grants, national defense, public sector wages, social security programs, pensions, and healthcare.

Policymakers decide which policy measures to implement based on a comparative assessment of the diverse available or possible options of fiscal adjustments and their effectiveness. In making such an assessment, policymakers need to consider the impact that each option may exert on the multiple diverse goals of fiscal policy at once, and find the combination that can minimize unwanted byproducts. Now that governments worldwide are struggling to restore fiscal stability in the aftermath of the global financial crisis, policymakers can enhance the consistency of their policy measures by revisiting all the existing measures in place overall. Fiscal adjustments, however, have traditionally succeeded when buttressed by the secure platform of economic growth. Economic growth not only reduces the gap between the gross domestic product (GDP) and the debts, but also enhances the government's capability to implement sustained fiscal improvements.

In order to ensure effective fiscal adjustments, policymakers thus need to improve and reform the incentive mechanisms and minimize market distortions in ways that promote economic growth. Afterward, they need to foster and reform the institutional environment based on considerations of distributive equity and other policy goals, such as short-term stability and long-term fiscal sustainability.

In addition to the diverse policy measures with which the government fulfills its roles, the political, social, and economic institutions of the given country are also important factors in determining the country's economic growth.[12] In order for diverse policy measures to produce the intended effects and help the government meet its policy goals, the surrounding institutions must work in ways that ensure and maximize the effectiveness of the policy measures that the government implements

12) Acemoglu et al. (2005) and Beck and Leaven (2006)

〈Table I-1〉 **Impact of Measures for Fiscal Stabilization**

		Growth		Equity		Current balance
		Short–term	Long–term	Short–term	Long–term	Mid– to long–term
Reduced spending	Education	—	—	–	—	+
	Healthcare (in kind)	—	–	–	–	++
	Other government consumptions (except family–related ones)	—	+	–		+
	Pensions		++			++
	Unemployment benefits	–	+	–		++
	Family	–	–	—	—	+
	Subsidies and grants	–	++	+	+	+
	Public investment	—	—			++
Increased tax revenue	Individual income tax	–	—	+	+	+
	Social security contributions	–	—	–	–	
	Corporate tax	–	—	+	+	++
	Environmental tax	–	+	–		+
	Consumption tax	–	–	–		++
	Real estate property tax	–				+
	Other property taxes	–		++	+	+
	Taxes on sales of goods and services	–	+	–	–	+

Note: The positive signs in the "Current balance" column indicate deficits. The opposite sign is used for surpluses

Source: Cournède et al. (2013)

3 Conclusion

The reverberations from the latest global financial crisis left many states worldwide in a state of confusion. This study explores the essential role of fiscal policy in this atmosphere and provides a comprehensive overview of fiscal trends. Reviewing issues faced by South Korea and other nations such as slow economic recovery, long-term deterioration in socioeconomic equity, the role of redistributive policies in times of crises, rising national debt levels, and the uncertain prospects of mid- to long-term fiscal stability, this study assesses the current status of typical fiscal policy goals, determines what specific measures are needed to achieve these goals, and delineates what policymakers should take into account when selecting one policy measure over another. In the remainder of this study, we explore the two main pillars of fiscal policy, i.e., fiscal spending and taxation, and the correlation between fiscal measures for growth and the problem of equity. As real-life and historical cases of successful fiscal reforms illustrate, it is impossible to ensure the effectiveness of fiscal adjustments without first achieving a measure of economic growth. We may list the different goals of fiscal policy all at once, but we need to prioritize among them when selecting the most effective ones. In Part II, we examine how the composition of fiscal spending affects economic growth, while in Part III we analyze how the structure of taxation impacts economic growth. Finally, in Part IV, we explore how the redistributive fiscal policy affects mid- to long-term economic growth. As most of these fiscal policy measures are often assumed to be in trade-off relationships with one another, we will discuss how we might choose and combine these different measures in a way that is both growth friendly and equity maintaining.

Ⅱ

Fiscal Spending and Economic Growth

1 Background

Struggling to overcome the global financial crisis that began in 2008, policymakers worldwide began to take increasing interest in the active role that fiscal policy could play in managing such a crisis. The dragging financial crisis in Europe and the rut of slow economic growth worldwide have further prompted governments and researchers alike to look for possible fiscal measures that can induce stable economic growth.

The onset of the latest global financial crisis has led the majority of governments worldwide to adopt an expansive fiscal posture, which has quickly worsened the fiscal deficits in many countries. These states thus took a radical turn in the other direction, and began to focus on securing greater fiscal resources so as to quicken the fiscal recovery process and brace for possible fluctuations in the business cycle in the future. As low economic growth has become a norm around the globe, governments have persisted in their policies for fiscal stabilization, while also introducing diverse new measures to promote stable economic growth.

The Korean policy circle has also long been voicing the need for more and wider-ranging research on the correlation between fiscal policy and economic growth. This study is a response to this need, and surveys the recent debates on the diverse ways fiscal spending affects economic growth so as to help policymakers make the right choices in the future.

This study provides a holistic overview of the many partial debates and arguments that have been put forward recently regarding the correlation between fiscal spending and economic growth. Moreover, this study also provides an empirical analysis of the effects that fiscal spending of diverse purposes exerts on economic growth using a consistent and uniform standard that can be applied to various states around the world, and compares the findings of that analysis to Korea's experiences, thereby delineating the implications of policy on fiscal resource distribution in the future. This study groups fiscal spending into a few categories and examines each in terms of defining characteristics.

Section 2 provides a survey of the established literature discussing how different fiscal spending items or categories affect economic growth, and examines recent trends and patterns in fiscal spending item by item in Korea and other OECD member states. Section 3 applies an endogenous growth model in order to demonstrate how fiscal spending and the structural changes thereof affect economic growth. Section 4 provides an empirical analysis based on a fixed-effect model. The analysis compares the OECD member states with one another in order to determine the correlations between fiscal spending of various categories and economic growth. Section 5 sums up the findings discussed in this part and discusses policy implications.

2 Fiscal spending and economic growth: recent trends

There is a well-established and flourishing body of literature worldwide on the impact of government spending on economic growth at multiple levels and via diverse channels. These studies serve to spark public controversies and raise key issues in one way or another. This study examines the established literature to find and redefine the categories of fiscal spending, and to examine their impact on economic growth.

Pitlik and Schratzenstaller (2011) first divide fiscal spending into two categories, namely, productive expenditure and unproductive expenditure. The former consists of core government spending, infrastructure expenditure, and merit-goods spending programs. The latter consists of redistribution, interest expenditure, and other types of spending. These categories indeed neatly match

〈Table II-1〉 **Functional Categorization of Fiscal Spending**

Theoretical category		Functional category(SNA, COFOG)
Productive expenditure	Core public spending (Gcore)	General administration (G1)
		National defense (G2)
		Order and safety (G3)
	Infrastructure spending (Ginfra)	Economic activities (G4)
		Housing and local development (G6)
		Environmental protection (G5)
	Merit-goods/externalities spending (Gmerit)	Healthcare (G7)
		Education (G9)
Unproductive expenditure	Redistributive spending (Gredv)	Social protection (G10)
	Other spending (Gother)	Recreation, culture, religion (G8)
	Interest spending	Interest payments

Source: Pitlik and Schratzenstaller (2011), rearranged by the authors

the functional spending categories listed in the Classification of Functional Expenditure of Governments (COFOG), used by such international organizations as the IMF, the United Nations (UN), and the OECD. <Table II-1> matches these functional categories of fiscal spending with the categories of fiscal spending found in theory and in real-life practices.

Now, let us define and examine each of these functional categories in depth. The first main category is that of core government spending programs or public services. This category encompasses spending on providing public goods and services, such as administration, order and safety, and national defense, as listed in the COFOG. These spending programs exert far-reaching and fundamental influences on economic growth, as they are crucial to the sustenance of the democratic system, the enforcement of law, and protection against external threats. These core spending programs, in other words, are at the core of any working capitalist-democratic order. As such, however, their impact on economic growth is not direct; rather, these programs focus on providing purely public goods that private markets, left unregulated, would not supply.

The second main category is that of infrastructure spending. This category mostly comprises of the public investment made in the development of the social

overhead capital (SOC) and economic development in general. It therefore encompasses economic activities, housing and local development, and environmental protection listed in the COFOG. These are the spending items that are most commonly associated with "productive expenditure," as they generate significant amounts of positive externalities in the private sector and thereby promote economic growth (see Aschauer (1989), Barro et al. (1995), Kamps (2005), and Ryu (2006, 2008, and 2012)). However, there are also numerous studies arguing that public investment in SOC and economic development, depending on the economic status of the given society and/or other macroeconomic settings, may be ineffective or even counterproductive. If we assume that there is a non-linear correlation between infrastructure spending and economic growth, as shown in the figure below, continuing increases in infrastructure spending may indeed be counterproductive past a certain inflection point. Ryu (2006) also points out that the amount of SOC stock in a given country, past the level that optimizes the country's economic growth rate, may contribute to the decline in the steady-state growth rate in the end.

The third category is that of spending for providing merit and public goods of the traditional mold, i.e., education and healthcare. Spending on these goods is often equated with investment in long-term economic growth in the endogenous growth model and other theories. In particular, advanced economies that are near-steady states and whose production occurs on the technology frontier crucially need investment in public education, healthcare, and other means of developing human resources in order to sustain their economic growth.

The fourth and final category is that of redistributive spending, or what the COFOG calls "social protection expenditure." Much of this category consists of transfer spending, whose effect on economic growth remains ambiguous. While some researchers argue that this type of expenditure exerts positive impact on economic growth in the long run (e.g., by upholding social peace and correcting labor market failures, etc.), others argue that it is ultimately counterproductive, as it weakens the incentives for active economic actors and encourages them to engage in unproductive, rent-seeking behavior.

3 Theoretical approach

In order to determine the correlation between different categories of government spending and economic growth, we use the endogenous economic growth model, first to find the formula for calculating the steady state economic growth. We then use this formula to determine the exact correlation between each category of fiscal spending and economic growth. In this study, we use the model introduced by Devarajan et al. (1996). We first assume the production function to be the CES (constant elasticity of substitution)-type, equating private-sector capital with k productive government spending with $q1$, and unproductive government spending with $q2$.

$$y = f(k,\ g_1,\ g_2) = \left[ak^{-\zeta} + bg_1^{-\zeta} + rg_2^{-\zeta}\right]^{-1/\zeta} \quad (1)$$

Where: $\alpha > 0,\ \beta \geq 0,\ \gamma \geq 0,\ \alpha+\beta+\gamma = 1,\ \zeta \geq -1$

Here, we introduce multiple regularity conditions and determine the long-term steady-state growth rate. Then we examine how changes in the weight (o) of productive expenditure (g_1) affect that rate. The $\frac{d\gamma}{d\phi} > 0$ depends on the productivity of productive expenditure,, and the productivity of unproductive expenditure, , as well as the initial distribution ratio. Formula (2) below thus comes to have a positive value.

$$\frac{\phi}{1-\phi} < \left(\frac{\beta}{\gamma}\right)^{\theta} \quad (2)$$

Where: $\theta = 1/(1+\zeta)$represents the elasticity of substitution.

According to Formula (2), changing the composition of government spending in order to induce further economic growth, i.e., spending more on productive expenditure, may notresult in a higher growth rate so long as the initial distribution ratio, ϕ, remains excessively high. For a more intuitive understanding of this fact, we apply the Cobb-Douglas production function ($\zeta = 0,\ \theta = 1$) and modify Formula (2) into Formula (3):

$$\frac{\phi}{1-\phi} < \frac{\beta}{\gamma} \tag{3}$$

According to Formula (3), in order to increase the steady-state growth rate by converting unproductive expenditures into productive ones, β must be greater than γ, and the relative distribution ratio must be smaller than the relative productivity (output elasticity) between the two types of expenditure.

As there are multiple categories of fiscal spending, we need to be able to expand this conclusion across the board. Assuming that there are a certain number (N) of fiscal spending categories, let us equate the productivity parameter and the distribution ratio of each category with β_1 and ϕ_1, respectively ($i = 1, 2, ..., N$). Then we can change Formula (3) into Formula (4) as shown below. The formula represents what is required in order for the redistribution of fiscal resources from sector to sector i to result in an increase in the steady-state growth rate.

$$\frac{\beta_i}{\phi_i} > \frac{\beta_i}{\phi_i} \tag{4}$$

In other words, the conversion of one category of expenditure into another may or may not result in an increase in the steady-state growth rate depending on the relative size of the standardized ratio of productivity to expenditure.

4 Empirical analysis

Our empirical analysis concerns 22 of the OECD member states and their fiscal performances during the years 1995 through 2007. There are a number of reasons for limiting the sample size and designating a short analysis period. First, the System of National Accounts (SNA) standard used by the OECD underwent a major update from SNA 1998 to SNA 2008. As a result, there were only a small number of member states from which fiscal statistics could be gathered according to the new standard. Second, we decided that, in order to determine the exact effect of changes in the composition of fiscal spending

on economic growth, we needed to confine our analysis to the period prior to the onset of the global financial crisis in 2008. The crisis prompted governments worldwide to adopt abnormally expansive fiscal programs in amount and scope towards achieving the goal of economic recovery. Thus in the interest of generalizability and consistency, we therefore decided to focus our analysis on the compositions of government expenditure in 22 OECD member states prior to 2008.

As our goal is to examine how the functional categories of government spending, listed in the COFOG, affect economic growth, we decided to appropriate the corresponding, yet more conveniently arranged, system of classification developed by Pitlik and Schratzenstaller (2011) in our empirical analysis.

This study demonstrates the correlation between the functional categories of government spending and economic growth in the selected OECD member states using a relatively simple fixed-effect model:

$$g_{it} = \triangle(y_{it}) = \gamma_1 (E/Y)_{it} + \gamma_1 (E/Y)_{it} + \sum_k \gamma_{2,k} (E/Y)_{it} + \psi_i + \omega_t + ...control variable$$

In this formula, the real growth rate (g_{it}) is the dependent variable. The explicatory variables are fiscal variables, such as the total spending/GDP ratio (E/Y), and the partial spending/total spending ratio (E_K/E). The model also includes other control variables.

The formula above has been quite popularly used in various international panel analyses since the study by Devarajan et al. (1996), which demonstrated the correlation between functional fiscal spending and economic growth using an endogenous economic growth model. Each explanatory variable in the formula represents the share of each category of spending in total spending. The formula also includes the total spending-to-GDP ratio in order to determine how the increase or decrease in a certain category of spending, while the total spending remains constant, affects growth. This formula therefore allows us to estimate how changes in the distribution of different categories of spending affect economic growth, and what kind of level effects the increase in total fiscal spending exerts on growth.

Now, let us discuss the findings of our empirical analysis. The first topic is how each category of fiscal spending, as classified according to the COFOG, affects economic growth.

Formula (1) in <Table II-2> shows that general administration expenditure (G1) exerts an effect of 0.248 on GDP growth rate. The average weight of general administration on fiscal spending amounts to 14.4 percent, while the average GDP growth rate is 3.60 percent. Given the effect of G1 in our formula, we can predict that a 1 percentage point increase in the share of general administration expenditure in total fiscal spending (e.g., from 14.4 to 15.4 percent) would raise the economic growth rate by 2.48 percentage points, all else being equal. If the GDP of a given country continues to grow at a rate of 3.60 percent every year for the 12 years of the analyzed period, it would grow from 100 to 152.9 naturally without any increases in the expenditures of any category. However, a 1 percent rise in the general administration expenditure would increase the GDP from 100 to 155.3. We can expect similar results from increases in other categories of spending as well.

Of the categories of spending listed in <Table II-2>, expenditure on national defense (G2), housing and local development (G6), and recreation, culture, and religion (G8) were found to have positive estimation coefficients. However, aside from the exception of defense expenditure, the other two were statistically insignificant. Defense expenditure was found to carry a significant positive estimation coefficient, but there is a raging controversy over whether increases in defense expenditure truly promote economic growth.[13] All the remaining categories were found to have negative estimation coefficients, as have been demonstrated in other studies already.

Note that the expenditure on economic affairs (G2) carries a negative estimation coefficient, albeit statistically insignificant. This result indicates that the investment that the OECD member states make in their respective economies is already past the inflection point, and that the marginal productivity of such

13) Defense expenditure may affect the economic growth of a country differently depending on the urgency or immediacy of the surrounding external threats. We cannot say for certain for now how the force of external threats establishes a correlation between defense spending and economic growth. On this matter, see Pitlik and Schratzenstaller (2011), pp. 13–15.

investment now continues to draw downward, as has been emphasized in numerous other empirical analyses. Economic affairs have accounted for 21.5 percent of all fiscal spending in Korea on average since the dawn of the new millennium, as the category includes major government investments in the development of SOC, such as transportation and communications facilities and infrastructures. Given the fact that Korea's economy converges much with the very advanced economies of OECD member states, the estimation result on the economic affair expenditure carries important policy implications for Korea as well.

Healthcare expenditure (G7) and social protection expenditure (G10) also showed negative estimation coefficients, whether significant or not. Increasing public spending on social services and welfare, in other words, may have repercussions for economic growth. However, as the focus of the present empirical analysis is on proving the existence of correlations between the functional fiscal spending of various categories, on the one hand, and economic growth, on the other, we must not jump to the conclusion and draw a causal link between the estimation coefficients and the status of economic growth. In order to ascertain such causal links, we need to identify a variety of other factors that may be possibly correlated to or intermediating in economic growth, including other input factors, technological innovation, and social and institutional conditions. For example, we can discuss the growth-promoting (or hampering) effect of the economic affairs expenditure (G4) only by first identifying how that expenditure contributes to the expansion of a given nation's SOC stock, and how that SOC stock, in turn, impacts the nation's economic growth. Similarly, we can discuss the growth-related impact of education expenditure (G9) and healthcare expenditure (G7) only by determining their impact on the formation of human resources in a given nation. Moreover, we can discuss the growth-related impact of social protection expenditure (G10) only after ascertaining how the redistribution of income reduces the income gap, and how the reduced income gap, in turn, leads to (or prevents) economic growth.

Next, following Pitlik and Schratzenstaller (2011), we group the categories of functional spending in the COFOG into a few groups sharing similar characteristics, and use these groupings as explanatory variables in our new estimations (<Table II-3>).

〈Table II-2〉 **Empirical Analysis of Functional Fiscal Spending and Economic Growth**

Dependent variable: economic growth rate										
Spending variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant	6.733*** (2.255)	5.639*** (2.091)	10.85*** (3.005)	8.728*** (1.950)	9.502*** (2.197)	8.831*** (2.015)	16.38*** (3.062)	7.894*** (2.366)	10.77*** (3.547)	16.92*** (3.996)
Total spending	−0.171*** (0.048)	−0.109*** (0.042)	−0.131 (0.047)	−0.114** (0.046)	−0.124*** (0.044)	−0.119** (0.047)	−0.190*** (0.047)	−0.111** (0.045)	−0.133*** (0.047)	−0.139*** (0.044)
General administration	0.248*** (0.066)	–	–	–	–	–	–	–	–	–
Defense	–	0.788*** (0.211)	–	–	–	–	–	–	–	–
Order and safety	–	–	−0.370 (0.420)	–	–	–	–	–	–	–
Economic affairs	–	–	–	−0.009 (0.079)	–	–	–	–	–	–
Housing / local development	–	–	–	–	−0.375 (0.477)	–	–	–	–	–
Environment protection	–	–	–	–	–	0.022 (0.144)	–	–	–	–
Healthcare	–	–	–	–	–	–	−0.330*** (0.127)	–	–	–
Education	–	–	–	–	–	–	–	0.269 (0.318)	–	–
Social protection	–	–	–	–	–	–	–	–	−0.104 (0.175)	–
Recreation / culture / religion	–	–	–	–	–	–	–	–	–	−0.205 (0.218)
Private investment	0.068 (0.188)	−0.196 (0.190)	−0.098 (0.217)	−0.129 (0.202)	−0.076 (0.206)	−0.142 (0.203)	−0.128 (0.196)	−0.155 (0.206)	−0.124 (0.209)	−0.305 (0.218)
EU membership dummy	0.941 (0.712)	0.666 (0.704)	0.480 (0.691)	0.628 (0.706)	0.692 (0.713)	0.636 (0.704)	0.837 (0.737)	0.532 (0.699)	0.576 (0.707)	0.969 (0.706)
	0.411	0.406	0.381	0.379	0.381	0.379	0.405	0.381	0.380	0.391
Observed estimate	283	283	283	282	283	283	283	283	283	283

Notes: 1) For the estimations, a panel–fixed effect model (including the nation–fixed effect) was used
2) Figures in parentheses indicate the standard deviations of the White Heteroschedasticity Consistent
3) The asterisks, ***, **, and *, represent the statistical significance levels of 1, 5, and 10percent, respectively
4) The nation–fixed effects have been omitted from the report in the interest of convenience

〈Table II-3〉 **Empirical Analysis of Functional Fiscal Spending and Economic Growth**

Dependent variable: economic growth rate							
Spending variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	3.724 (3.574)	8.734*** (2.683)	17.903*** (3.941)	16.916*** (3.996)	7.894*** (2.366)	−2.962 (4.785)	16.320*** (5.213)
Total spending	−0.165*** (0.057)	−0.115 (0.074)	−0.197*** (0.050)	−0.139*** (0.044)	−0.111** (0.045)	−0.147* (0.074)	−0.140** (0.070)
Productive spending	–	–	–	–	–	0.209** (0.095)	–
Unproductive spending	–	–	–	–	–	–	−0.174** (0.087)
Gcore	0.284*** (0.102)	–	–	–	–	–	–
Ginfra	–	−0.007 (0.057)	–	–	–	–	–
Gmerit	–	–	−0.208** (0.090)	–	–	–	–
Gredv	–	–	–	−0.205** (0.087)	–	–	–
Other	–	–	–	–	0.269 (0.318)	–	–
Private investment	0.046 (0.326)	−0.129 (0.407)	−0.071 (0.207)	−0.306 (0.218)	−0.155 (0.206)	−0.287 (0.507)	−0.270 (0.427)
EU membership dummy	1.114** (0.436)	0.625 (0.410)	0.696 (0.717)	0.969 (0.706)	0.532 (0.699)	0.998*** (0.218)	0.980*** (0.263)
	0.424	0.379	0.398	0.391	0.381	0.392	0.388
Observed estimate	283	282	283	283	283	282	283

Notes: 1) For the estimations, a panel–fixed effect model (including the nation–fixed effect) was used
2) Figures in parentheses indicate the standard deviations of the White Heteroschedasticity Consistent
3) The asterisks, ***, **, and *, represent the statistical significance levels of 1, 5, and 10percent, respectively
4) The nation–fixed effects have been omitted from the report in the interest of convenience

First, with total spending remaining constant, the spending in the Gcore group − on general administration, defense, and order and safety − shows a positive estimation coefficient of 0.284, replicating the findings from the earlier estimations. The spending in the Ginfra group − on economic affairs, and housing and local development − shows a negative coefficient, albeit statistically

insignificant. Again, in the majority of the OECD member states covered here, investment in economic affairs bears little impact on promoting economic growth. The Gmerit group—on environmental protection, healthcare, education, and the production or maintenance of other merit goods—and the Gredv group (i.e., expenditure on income redistribution) both show statistically significant negative estimation coefficients. In other words, direct increases in these types of expenditures will exert a negative impact on economic growth, all else being equal. However, given the diversity of the intermediary variables and paths involved and the long-term socioeconomic consequences, investment in these causes may not always or necessarily be harmful to economic growth.

5 Conclusion

This report provides both a theoretical survey and an empirical analysis of the correlation between government spending and economic growth. There have been numerous debates regarding how government spending affects economic growth, at various levels and via different paths. We can categorize fiscal spending by either function or nature. This study examines the effects of fiscal spending of various functional categories and groups thereof.

In the literature survey, we delve into other researchers' arguments and conclusions regarding whether fiscal spending leads to stronger economic growth. From the established literature we can see how increases in total spending and changes in the composition of fiscal spending impact economic growth. As for the latter, in particular, we can examine how different ways to categorize or group spending—productive vs. unproductive, theoretical, or functional (COFOG-based)—lead to different conclusions regarding economic growth. First, in order for an increase in total spending to lead to a rise in the economic growth rate, the productivity effect resulting from that increase must exceed the cost of redistributing fiscal resources. Next, in order to increase the steady state growth rate by converting unproductive spending into the productive variety, we also need to ensure that the relative ratio between the two types of spending remain smaller than the relative productivity (or output elasticity) between them. Finally, assuming multiple types or categories of fiscal spending, and conversion

from one spending category to another, the impact on the steady state growth rate varies depending on the relative sizes of the ratio of productivity standardized as a weight in spending.

Functional fiscal spending is categorized by the specific role and function it plays in the given economy and society. Economic growth is not and should not be the sole purpose or function of these different categories of spending. In particular, spending on social protection, healthcare, and other such services and welfare does not primarily strive to promote economic growth. Rather, their impact on improving social equity and developing human capital may indirectly serve the interest of economic growth.

The structure of fiscal spending in Korea shows an excessive focus on infrastructure development and the underdevelopment of spending on income redistribution, in comparison to the OECD average. The glaring gap between the two types of fiscal spending in Korea, however, will gradually narrow in the future. Considering the conclusions of numerous studies pointing out the non-linear correlation between infrastructure investment and economic growth, continuing to invest in SOC development may indeed negatively affect Korea's prospects of future economic growth.

Ⅲ

Taxation Policy and Economic Growth

1 Background

Market inefficiency or economic distortions caused by taxation forms a central subject of fiscal policy studies. For a key role of government is to find and secure the fiscal resources it needs in order to implement its programs, while also minimizing the economic burdens on society. The decline in economic efficiency caused by taxation is often called a "deadweight loss" or an "excess burden." Taxing economic actors for the purpose of raising fiscal resources for the state inevitably distorts economic actors' actions and behavior. The additional cost taxpayers and society as a whole pay accordingly is the excess burden. As the burden of taxation varies in amount depending on individual economic actors' actions, the majority of taxes[14] are bound to cause excess burdens. The task of designing an optimal taxation system therefore involves finding the one that minimizes anticipated economic distortions. It is therefore of paramount importance for policymakers and society as a whole to find and establish a taxation system that can raise the required amounts of fiscal resources and distributes tax burdens equitably, while also keeping tax burdens minimal.[15]

14) Lump-sum taxes may be the more efficient way of taxing economic actors, but they do not directly reflect taxpayers' choices and capability to pay taxes, such as their income and consumption. They are therefore unlikely to be used in real life

15) For a more detailed discussion on the efficiency of taxation, see Auerbach and Hines (2001)

Notwithstanding the apparent economic burdens taxation imposes, researchers have been struggling to find uncomplicated empirical evidence of how the cost of taxation affects the national economy and its growth. There are numerous empirical studies demonstrating the correlation between changes in taxpayers' behavior and the excess burdens caused by individual taxes. However, no conclusive evidence has emerged, as of yet, regarding how the sum of these burdens affects economic growth on the whole. This is due to the absence of a comprehensive structural model showing the paths of taxpayers' reactions and behaviors, and also to the difficulty of measuring marginal tax rates on the national level.

In this part, we apply a more advanced model to analyze how taxation and other fiscal variables affect the income growth rate, in response to the growing demand for greater spending on social and welfare services and the equally important need for determining how the increase in spending (and henceforth the tax burdens) would impact economic growth. What matters is not only the reality of additional taxes but also how the additional tax revenue is spent. In order to include all the paths of taxpayers' reactions to the increased tax burden into our model, we included the size of the informal sector therein, and also took into account the endogeneity between the marginal tax rate and the growth rate. The inclusion of the informal economic sector added to the reality of our estimates on changes in taxpayers' behavior, while the endogeneity of the marginal tax rate was crucial to ensuring the accuracy of our empirical analysis. Reflecting upon the conclusions of previous studies, we also estimated separate marginal tax rates for both income and corporate taxes. Considering that the effect of increased tax burdens on economic growth would take some time to manifest, we analyzed average economic growth rates over a 10year period as well as panel data on growth rates over the past 10 years.

2 Theory[16]

The general tendency in the established literature has been to study how the taxation policy affects economic growth, via either the cost of funds or the production function (including government size). Studies analyzing how the cost of funds translates into social cost and affects economic growth seek to determine how the distortion of the relative price structure of the market, caused by taxation, impacts growth. The degree of market distortion caused by taxation varies depending on tax items. The general rule is that taxes with progressive rate structures cause greater market distortion. The amount of tax revenue is another decisive factor in market distortions.

On the other hand, studies approaching the matter from the perspective of the production function analyze how governmental intervention in research and development, the accumulation of human capital, and the provision of public goods change the production function. For example, an increase in the size of agiven government may induce an increase in the production of public goods, and, in turn, lead to a change in the nationwide structure of production, thus affecting the economic growth rate. However, the main paths via which the taxation policy affects the production function (and henceforth economic growth) are government support for research and development and for the accumulation of human capital. Both the quality and quantity of human capital influence economic growth, particularly by way of education that is funded by taxes. R&D is another important factor that raises productivity and promotes economic growth. The taxation policy can significantly affect the level and quality of R&D in a given nation.

We may express the impact of a taxation-subject production function on economic growth as follows:

$$g_y = g_y(a_1(t_1,t_2),\ a_2(t_1,t_2))$$

16) A summary of Myles (2006)

Here, g_y stands for the economic growth rate, while $a_1(\cdot), a_2(\cdot)$ represent the two main factors influencing economic growth, i.e., R&D and education. t_1, t_2 stand for the tax rates on the two factors.

The impact of changes in the taxation policy on the economic growth rate can be expressed as a multiple of the two factors as follows:

$$\frac{dg_y}{dt_1} = \frac{\alpha g_y}{\alpha a_i} \frac{da_i}{dt_i}$$

In other words, changes in tax rates influence economic growth indirectly by affecting two major factors of growth, R&D and education. These two variables impact economic growth by being multiplied together. Therefore, regardless of how large the influence of tax rates on each of these two factors, the influence of tax rates on economic growth per se will be kept minimal if each of these factors exerts little influence on economic growth. In other words, different governments may impose the same tax rates, but these rates will have different economic impact depending on the policy environments those governments respectively face.

In order to gain an accurate understanding of how the taxation policy affects economic growth, we need to understand how tax burdens affect the educational attainments and the R&D investment of economic actors, and how the changing levels of these actors' educational attainments and R&D investments, in turn, affect economic growth. Numerous studies have focused on how the taxation policy impacts each of these factors, i.e., da_i/dt_i, dealing relatively short shrift to the influence of each of these factors on economic growth ($\alpha g_i/\alpha a_i$). Even the studies that do deal with the latter topic tend to be theoretical rather than empirical in their approach.

3 Empirical analysis

A. Literature survey

The correlation that taxation (and fiscal spending) bears to the economic growth rate can be either negative or positive. The negative correlation reflects the reverse incentive effects that taxation may have on economic actors' decision-making processes and that lead to market distortions. The positive correlation, on the other hand, reflects the indirect effect of spending the additional revenue raised by taxes. In order to measure the impact of taxation, we therefore need to develop a model that can single out the impact of additional fiscal spending.

Much of the established literature on the correlation between taxation and growth fails to provide consistent conclusions regarding the impact and statistical significance of taxation. In particular, the progressive tax system presents great difficulties in identifying the marginal tax rates in empirical analyses. Empirical studies on national data do support a weak negative correlation between marginal tax rates and growth rates.[17] However, no conclusive evidence has been found regarding whether that negative correlation stems from individual income tax rates or corporate tax rates.

Plosser (1992) showed a negative correlation between the GDP-per-capita growth rate and the average tax rate. Myles (2007) further demonstrated that this weak correlation stands even when we extend the scope of time subject to analysis to between 1960 and 2004. However, both studies show simple correlations only, leaving much room for regression analyses and tests that involve other explanatory variables. We must also decide whether to use the average tax rate or the marginal tax rate as our taxation variable. The theoretical consensus tells us that it is the marginal tax rate that causes market distortions and/or behavioral changes in economic actors. Therefore, we will proceed with marginal tax rates from now on.

17) Gareth Myles, *Economic Growth and the Role of Taxation*, 2007

Koester and Kormendi (1989) used IMF data on 63 countries to estimate average and marginal tax rates, and ran these through regression analyses with respect to economic growth rates. The statistical significance of the tax rates, however, varied depending on whether the initial income level was or was not included in the model. While the regression analysis involving tax rates as sole variables retained statistically significant negative correlations, such statistical significance dissipated when the initial income level was included in the model. Koester and Kormendi (1989) estimated the marginal tax rate of each country by running a regression analysis on the constant of the country's tax revenue and GDP, and using the resulting coefficient. They assumed a fixed marginal tax rate throughout the given temporal scope of their analysis, but such an assumption makes it difficult to apply their findings to countries that experienced dramatic changes in tax rates during the same period of time. The generalizability of Koester and Kormendi's study is further curtailed by the fact that their sample included countries in diverse phases of development.

Easterly and Rebelo (1993) estimated marginal tax rates using the distribution of personal income tax rates. They also tested the statistical significance of their marginal tax rate by including a variety of related factors into their basic growth rate model (e.g., the initial-year income, the school enrollment rate, the experiences of war and revolution, the assassination rate, etc.). The distribution of the personal income tax rates provides a firmer and more reliable ground for estimating the marginal tax rate in a given national economy. Easterly and Rebelo revealed that the majority of the tax-related variables in Koester and Kormendi (1989), including the marginal tax rates, lacked statistical significance. Even some of the significant variables showed declining significance levels depending on the structures of the models used. In general, tax-related variables show great susceptibility to changes in the structures of analysis models.

Padovano and Galli (2001) readjusted the marginal tax rate formula of Koester and Kormendi (1989) and applied their own estimated marginal tax rates to a regression analysis. In order to derive marginal tax rates, Padovano and Galli performed regression analyses on the constant of tax revenue, the GDP, the tax rate moving dummies, and the tax rate slope dummy . Here the marginal tax rate was expressed as a coefficient of the GDP variables. In their

study the tax rate retained a statistically significant negative correlation to GDP growth, and the average tax rate lacked significance.

Slemrod (1995) pointed out the deficiencies of models that are based only on small causal links between growth and tax rates (due to the weakness of the correlation between the GDP-per-capita growth rate and government spending) and the difficulty of making international comparisons without taking into account the paths by which economic actors change their behavior in response to tax burdens. Despite empirical findings to the contrary, economic theories assert that high marginal tax rates reduce the economic growth rate by causing distortions in economic actors' behaviors.

In an effort to overcome these problems, some, like Engen and Skinner (1996), have advocated adopting a microeconomic and bottom-up approach instead of the macroeconomic and top-down approach prevalent in the literature. These authors argue that we estimate changes in labor supplies, investment, and productivity stemming from changes in tax rates, and convert these estimates into influences on economic growth rates. However, even this approach is not entirely immune to calculation problems.

Lee and Gordon (2005), on the other hand, sought to identify and analyze in what ways taxation affects economic growth, and confirm that corporate tax rates are more significant factors than personal income tax rates. Their model of analysis assumes corporate activities as important components of economic growth. In order to avoid the problem of estimating marginal tax rates, these authors also applied the top statutory tax rate in their analysis, on the assumption that the highest tax rate is applied to successful entrepreneurs. Moreover, these authors also avoided the problem of endogeneity in marginal tax rate estimates by creating an instrumental variable, which estimates the weighted averages of the tax rate variables of neighboring states applying the reciprocal distances. Lee and Gordon conclude that, while personal income tax rates do not exert a significant influence on economic growth rate, corporate tax rates do.

Despite the array of economic theories, we cannot easily ascertain and confirm the significance of tax-related variables for multiple reasons. First, the models of analysis typically used fail to encompass the specific ways individuals respond to additional tax burdens. The informal market has been missing from all previous attempts at analyzing possible correlations. Second, the methods

used until now to estimate marginal tax rates have also shown some weaknesses. In order to define and measure the marginal tax rate representative of a given economy, we need to carefully distinguish between taxes, while also keeping in mind the risk of endogeneity in the tax rate estimates we obtain. We need to improve the existing model of analysis by taking into account the types of changes observed in economic actors' behaviors in response to changes in tax burdens.

In order to give due notice to the informal sector that significantly shapes the changing behaviors of taxpayers in response to additional tax burdens, this study includes estimates of underground economies, as reported in Schneider et al. (2010), as independent variables in the analysis. Moreover, in our attempt to encompass movements in income across time, we used the average economic growth rate of a decade. We also performed a panel analysis to account for the convergence of the tacitly assumed paths of growth in our international comparison. The panel analysis allowed us to take into account the particular and unique characteristics of each nation analyzed, while also enabling us to analyze the common influences of taxation and fiscal policies on economic growth.

B. Empirical analysis

The empirical analysis again concerned the OECD member states, with the necessary measures taken to account for differences in the degree of development among the nations and also to ensure statistical consistency. Moreover, in order officially include the role of the informal sector in the analysis, data on the sizes of informal sectors in various countries, provided by Schneider et al. (2010), were used. The top statutory tax rate in each country was used as a substitute for the marginal tax rate, for it is this rate that affects businesses and entrepreneurs, the primary actors in a state's economic growth. In an effort to avoid the problem of endogeneity in measuring marginal tax rates, the tax rates of neighboring states (that share borders) were averaged. For each state without neighboring states sharing borders, the tax rates of proximate states were averaged.

Considering the conclusions reached in earlier studies, our analysis model

posited the average economic growth rate during the given period of time ($G_r(PCG_i)$) as the dependent variable, treating it as a function of the marginal tax rate (MTR_i), along with the initial income level ($\ln(PCG_{IO})$)[18] as well as other economic impetuses for growth (X_i), such as the population rate, the inflation rate, the openness of the economy, the enrollment rate in educational institutions, the size of the government, the R&D investment rate, and the size of the informal sector.

$$Gr(PCG_i) = \beta_o + \beta_1 \ln(PCG_{i0}) + \beta_2 ..nX_i + \beta_{n+1} MTR_i + \theta_i$$

The initial income level is used to reflect the differences in the paths of growth that different countries take given varying levels of initial income. The population growth rate represents the quantitative growth of human capital, while the educational institution enrollment rate represents the qualitative side. The inflation rate reflects the stability of economic activities, while the economic openness (i.e., dependency on trade with external parties) indicates the impetus present for economic growth. The size of the government stands in for the availability of public goods, while the R&D investment rate (as a percentage of GDP) reflects the amount of capital formation for enhancing productivity.

In order to avoid the problem of measuring marginal tax rates, we used the top statutory rates on personal income and corporate taxes, akin to Lee and Gordon (2005). We avoid the problem of endogeneity by substituting for the marginal tax rate of each country the average tax rates of the neighboring states. We do not include marginal rates on taxes other than personal income and corporate taxes in our analysis. For there is not much variation in marginal rates on consumption taxes in general, such as value added taxes (VATs). Moreover, much of the revenue from these other taxes is represented by the size of the government (or the total tax burden).[19]

18) While the inclusion of the initial income level in the regression formula may cause endogeneity, any possible influence will be trivial, as each variable is measured with respect to not each single year, but as an average of each decade

The model divides a period of 30 years, between 1981 and 2012, into three decades[20] so as to estimate the average growth rate for each decade and include it in the regression analysis of tax and other economic variables. The decades subject to our analyses are therefore 1981 to 1991, 1991 to 2000, and 2001 to 2012. As for tax-related variables, we referred to the tax statistics available from the OECD. We also took into account the top statutory tax rates from both the central and local governments. The OECD's tax statistics provide local government tax rates for certain member states only, which makes it difficult to delineate the standard tax burden. However, the database does provide local tax rates in the case of corporate taxes. We also included the marginal tax rates estimated by Koester and Kormendi (1989) to provide a comparison with our top statutory tax rates.

Given the limits of the data at our disposal, we included the educational institution enrollment rate for people aged 15 to 19, the informal sector ratio, and the size of the government in our analysis with respect to only the latter two decades starting in 1991. In particular, as for the informal sector, we were able to find data going back to 1999 at the earliest in Schneider at al. (2010). The informal sector data we included in our analysis therefore represent averages from the periods 1999 to 2000 and 2001 to 2007. As for the size of the government (or the level of government spending), the scope of relevant statistics also differed by nation. As for the states that joined the OECD relatively late－i.e., Slovenia, Poland, Korea, Hungary, Estonia, and the Czech Republic－and for the Netherlands and Luxembourg, the averages of the period 1995 to 2000

19) Lee and Gordon (2005) and numerous other studies similarly do not take into account VAT marginal rates

20) There is, as of yet, no theoretical basis that requires the time period of economic growth rate analysis to be defined in a certain way. There is, moreover, no literature on the movement of taxpayers' income from one point in time to another. However, it would be unreasonable to assume that the majority of taxpayers will engage in avoidance behavior like moving their income every 10 years or so. Moreover, we need to give enough time to each variable until it begins to exert manifest influences on economic growth. Hence the use of decades in our analysis. Previous studies involving non–panel analyses also divide their temporal scopes into decade–long or longer periods, while other studies involving panel analyses limit their temporal scopes to a five–year period or so each. These represent random choices rather than a following of definite rules. In order to ensure the consistency of our findings, we divided our temporal scope into decades, irrespective of whether we used panel data

were used. Slovakia's government size was measured on the basis of the shortest span of time, i.e., 1997 to 2000. As for the educational institution enrollment rate, data are available only from the year 2005 and onward. Therefore, we

〈Table III-1〉 **Basic Statistics on Regression Analysis Variables**

Variable	n	Avg.	S.D.	Min.	Max.
Top statutory personal income tax rate, 1981–1990 (%, OECD)	25	52.28	13.91	11.50	70.88
Top statutory personal income tax rate, 1991–2000 (%, OECD)	34	41.19	11.26	11.43	60.00
Top statutory personal income tax rate, 2001–2012 (%, OECD)	34	36.80	9.26	11.67	52.00
Top statutory personal income tax rate (local tax included), 1981–1990 (%, OECD)	25	58.80	8.48	42.75	82.70
Top statutory personal income tax rate (local tax included), 1991–2000 (%, OECD)	34	45.93	8.83	26.00	65.12
Top statutory personal income tax rate (local tax included), 2001–2012 (%, OECD)	34	42.02	8.24	23.60	56.30
Top statutory corporate tax rate, 1981–1990 (%, OECD)	24	45.65	6.72	31.90	59.45
Top statutory corporate tax rate, 1991–2000 (%, OECD)	34	34.91	7.29	15.00	55.10
Top statutory corporate tax rate, 2001–2012 (%, OECD)	34	27.70	6.10	13.42	39.87
Koester and Kormendi tax rate, 1981–1990 (%, est.)	25	35.74	10.19	15.37	56.93
Koester and Kormendi tax rate, 1991–2000 (%, est.)	34	37.14	11.75	14.01	62.27
Koester and Kormendi tax rate, 2001–2012 (%, est.)	34	33.47	8.38	21.13	53.63
GDP per capital increase rate, 1981–1990 (% p.a., OECD)	26	2.33	1.42	–0.33	7.19
GDP per capital increase rate, 1991–2000 (% p.a., OECD)	34	2.586	1.47	0.50	6.61

〈Table III-1〉 **Continued**

Variable	n	Avg.	S.D.	Min.	Max.
GDP per capital increase rate, 2001–2012 (% p.a., OECD)	34	1.396	1.20	–0.42	4.38
GDP per capital, 1980 (since 2005, PPP USD, OECD)	26	18922	5781	5907	29060
GDP per capital, 1990 (since 2005, PPP USD, OECD)	29	22337	8221	6595	42701
GDP per capital, 2000 (since 2005, PPP USD, OECD)	34	26361	10789	9732	60993
Population increase rate, 1981–1990 (% p.a., OECD)	27	0.72	0.69	0.03	2.69
Population increase rate, 1991–2000 (% p.a., OECD)	34	0.64	0.74	–1.28	3.04
Population increase rate, 2001–2012 (% p.a., OECD)	34	0.67	0.56	–0.31	1.93
Avg. inflation, 1981–1990 (%, OECD)	27	15.95	25.38	2.05	118.27
Avg. inflation, 1991–2000 (%, OECD)	34	8.86	14.91	0.85	76.70
Avg. inflation, 2001–2012 (%, OECD)	34	3.08	2.65	–0.23	16.41
Avg. trade dependency rate, 1981–1990 (% of GDP, OECD)	27	63.25	36.12	18.06	188.70
Avg. trade dependency rate, 1991–2000 (% of GDP, OECD)	33	72.33	39.08	18.24	213.13
Avg. trade dependency rate, 2001–2012 (% of GDP, OECD)	34	93.06	53.16	26.37	297.66
Avg. R&D investment, 1981–1990 (% of GDP, OECD)	25	1.43	0.75	0.24	2.62
Avg. R&D investment, 1991–2000 (% of GDP, OECD)	33	1.57	0.78	0.30	3.22
Avg. R&D investment, 2001–2012 (% of GDP, OECD)	34	1.86	0.99	0.38	4.12
School enrollment rate (age 15–19), 1995 (%, OECD)	27	73.62	14.25	29.87	93.78
School enrollment rate (age 15–19), 2006 (%, OECD)	33	81.21	11.23	45.16	95.46
Avg. informal sector ratio, 1999–2000 (% of GDP, Schneider et al.)	34	19.54	6.92	8.70	32.70

〈Table III-1〉 **Continued**

Variable	n	Avg.	S.D.	Min.	Max.
Avg. informal sector ratio, 2001–2007 (% of GDP,Schneider et al.)	34	18.90	6.63	8.50	30.96
Avg. government spending ratio, 1991–2000 (% of GDP, IMF)	31	43.31	10.73	15.75	63.44
Avg. government spending ratio, 2001–2012 (% of GDP, IMF)	34	41.96	8.61	19.50	54.85
Avg. tax burden rate, 1981–1990 (% of GDP, OECD)	27	32.13	9.77	13.18	49.35
Avg. tax burden rate, 1991–2000 (% of GDP, OECD)	34	34.54	8.37	15.78	49.01
Avg. tax burden rate, 2001–2012 (% of GDP, OECD)	34	34.42	7.42	18.09	48.45

Sources: OECD Statistics and IMF database

used only data from 1995 and 2006 in our regression analysis. As for government size, we used IMF statistics rather than OECD ones, as the former provide information on much a wider range of states and years.

As for initial income levels, we substituted the GDP per capita from 1980, 1990, and 2000. As for the average population increase, inflation, and trade dependency rates, we used the average rate from each year included in our analysis.

Our regression analysis of each decade revealed no statistically significant influences of marginal tax rates.[21] During the three decades from 1981 to 2012, corporate, central, and local tax variables were found to exert a negative influence on the GDP-per-capita growth rate, but not with any statistical significance. The tax variables were not only statistically insignificant, but also contradicted economic intuition when we did not take into account the endogeneity of those variables.

The informal sector, which enables taxpayers to avoid paying taxes and

21) While the sample size of our analysis is relatively small, as it chiefly concerns the member states of the OECD only in the interest of international comparability, our conclusions are also supported in part by the findings from our panel analysis

which is included in the analysis with respect to the 2001 to 2012 period, was shown to prevent economic growth with statistical significance in the simple ordinary least squares (OLS) regression analysis. However, when the endogeneity-controlling instrumental variables were applied, the level of

〈Table III-2〉 **Growth Rate Regression Analysis (2001-2012)**

Analysis type	OLS (1)	OLS (2)	IV (3)	IV (4)
Corporate income tax rate, 2001–2012	0.034 (0.233)	0.026 (0.336)	–0.043 (0.251)	–0.052 (0.181)
Central govt. income tax rate, 2001–2012	–0.011 (0.392)		–0.035 (0.124)	
Overall income tax rate, 2001–2012		–0.021 (0.281)		–0.001 (0.965)
Ln (GDP per capita), 2000	–3.004 (0.000)***	–2.836 (0.000)***	–2.143 (0.001)***	–2.195 (0.002)***
Population increase rate, 2001–2012	0.120 (0.712)	0.093 (0.768)	–0.041 (0.890)	–0.135 (0.236)
Avg. inflation, 2001–2012	0.118 (0.072)*	0.115 (0.076)*	0.101 (0.111)	0.077 (0.236)
Avg. trade dependency, 2001–2012	0.007 (0.007)***	0.007 (0.014)**	0.007 (0.007)***	0.006 (0.021)**
Avg. R&D investment, 2001–2012	0.450 (0.005)***	0.521 (0.002)***	0.332 (0.034)**	0.398 (0.017)**
School enrollment rate (age 15–19), 2006	0.052 (0.008)***	0.049 (0.009)***	0.038 (0.024)**	0.034 (0.051)*
Avg. informal sector ratio, 2001–2007	–0.057 (0.032)**	–0.053 (0.045)**	–0.042 (0.106)	–0.037 (0.196)
Avg. govt. size, 2001–2012	–0.057 (0.002)***	–0.052 (0.006)***	–0.072 (0.001)***	–0.074 (0.001)***
N	33	33	33	33
Adj. R-square	0.7406	0.7458	0.7688	0.7419

Notes: 1) The dependent variable is the GDP-per-capita growth rate. The constant is included in the regression analysis formula, but its results are not indicated herein
2) Figures in parentheses represent p-values
3) The asterisks, *, **, and ***, indicate significance levels of 10, 5, and 1percent, respectively

statistical significance declined. This may indicate that the growth-undermining influence of the informal sector may not be as significant in OECD member states, which are mostly advanced, wealthy economies.[22)]

〈Table III-3〉 **Growth Rate Regression Analysis (1981-1990)**

Analysis type	IV(3)	IV(4)
Corporate income tax rate, 1991–2000	–0.001 (0.983)	–0.076 (0.118)
Central govt. income tax rate, 1991–2000	–0.075 (0.106)	
Overall income tax rate, 1991–2000		–0.048 (0.304)
Ln (GDP per capita), 2000	–1.960 (0.194)	–1.092 (0.468)
Population increase rate, 1991–2000	–1.189 (0.139)	–0.784 (0.309)
Avg. inflation, 1991–2000	–0.185 (0.112)	–0.068 (0.504)
Avg. trade dependency, 1991–2000	0.027 (0.002)***	0.026 (0.004)***
Avg. R&D investment, 1991–2000	–0.727 (0.055)*	–0.488 (0.181)
Govt. size, 1991–2000	–0.063 (0.065)*	–0.029 (0.276)
N	21	21
Adj. R–square	0.5810	0.5203

Notes: 1) The dependent variable is the GDP–per–capita growth rate. The constant is included in the regression analysis formula, but its results are not indicated herein
2) Figures in parentheses represent p–values
3) The asterisks, *, **, and ***, indicate significance levels of 10, 5, and 1percent, respectively

22) The fact that a country is a member state of the OECD may indicate that the informal sector of that economy is already well under control. The influence of the informal sector on OECD member states therefore may be minimal. The findings and conclusions of this study thus may not be applicable to the development experiences of developing countries

The government spending variable, on the other hand, was shown for certain to exert a statistically significant impact on the economic growth rate. Every 10percent increase in the size of the government (as a ratio to GDP) led to a 0.7percent drop in the GDP-per-capita growth rate. The R&D investment, which is a main impetus for increases in productivity, also statistically increased the economic growth rate, with every 10percent increase in the investment (as a ratio to GDP) raising the GDP-per-capita growth rate per year by 3to 4percentage points. Moreover, the growth-promoting effect of R&D investment far exceeded the growth-interfering effect of the increasing size of the government, indicating raised productivity as the main source of economic growth in the case of advanced countries.

The analysis of the decade 1991 to 2000 also shows that all marginal tax rate variables conform to economic intuition to some extent, but without much statistical significance. The initial income level, the size of the government, and the R&D investment－the variables that were found to be significant in the analysis of the post-2000 decade－failed to show comparable significance in this decade. The trade dependency variable, on the other hand, retained its strong growth-stimulating effect. The simple regression analysis of the post-2000 decade, using top statutory tax rates, revealed that the formula itself lacked statistical significance. The findings thereof were therefore omitted from the list.

The analysis of the decade 1981 to 1990 revealed that no variables, except the initial income level, carried statistical significance. These variations in the decade-by-decade analysis indicate that the growth-related impact of certain variables, such as trade dependency, the size of the government, and the R&D investment, tends to grow as time goes by, reflecting the increasingly central role of trade and technological innovation in national and global economies. In the meantime, the growth-negating impact of the increasing size of the government also becomes stronger over time. As international competition is on the rise amid the march of globalization, the significance of fiscal variables continues to grow.

While making the best possible use of the information provided by long-term statistics, we also performed a panel analysis of each decade's growth rate in an attempt to control the nation-by-nation and decade-by-decade particularities not comprehended in the cross-section analysis.

〈Table III-4〉 **Growth Rate Regression Analysis (1981-1990)**

Analysis type	OLS(1)	OLS(2)	IV(3)	IV(4)
Corporate income tax rate, 1981–1990	0.004 (0.850)	0.003 (0.902)	–0.025 (0.358)	–0.013 (0.654)
Central govt. income tax rate, 1981–1990	–0.007 (0.553)		–0.019 (0.232)	
Overall income tax rate, 1981–1990		0.015 (0.404)		–0.006 (0.851)
Ln (GDP per capita), 2000	–3.379 (0.007)***	–2.708 (0.012)**	–3.353 (0.001)***	–3.320 (0.002)***
Population increase rate, 1981–1990	–0.291 (0.513)	–0.243 (0.583)	–0.005 (0.990)	–0.049 (0.908)
Avg. inflation, 1981–1990	–0.147 (0.022)**	–0.126 (0.035)**	–0.070 (0.096)*	–0.073 (0.101)
Avg. trade dependency, 1981–1990	–0.008 (0.198)	–0.008 (0.185)	–0.002 (0.723)	–0.004 (0.515)
Avg. R&D investment, 1981–1990	0.058 (0.866)	0.101 (0.762)	0.425 (0.097)*	0.438 (0.112)
N	22	22	22	22
Adj. R–square	0.4449	0.4600	0.4672	0.4095

Notes: 1) The dependent variable is the GDP–per–capita growth rate. The constant is included in the regression analysis formula, but its results are not indicated herein
2) Figures in parentheses represent p–values
3) The asterisks, *, **, and ***, indicate significance levels of 10, 5, and 1percent, respectively

The analysis revealed the marginal corporate tax rate to be a manifest factor limiting economic growth. The top statutory corporate tax rate retained a significance level of 10 percent. Its influence on economic growth, however, took a slight dip when the instrumental variables were used, compared to the one observed in the simple OLS analysis. The estimation led to the conclusion that a 10 percent decrease in the corporate tax rate would raise the annual economic growth rate by 0.4 to 0.5 percentage points. This is significant, considering that the GDP-per-capita growth rate of the OECD member states grows at 2 percent or so a year on average. On the other hand, the estimate is quite low in comparison to the forecast of 1 to 2 percent increases made by Lee and Gordon (2005) regarding the 10percent decrease in the corporate

tax rate in a study which dealt with a set of samples that included developed and developing countries alike. Nevertheless, as Lee and Gordon's data set included developing and rapidly growing countries, their estimate does not amount to a contradiction of ours.

The personal income tax rate also showed statistical significance. The statistical significance of this tax rate, which was rather low in the simple OLS analysis, rose significantly when the instrumental variables were used, thus revealing that even the marginal personal income tax rate served to hinder economic growth. As a matter of fact, the personal income tax rate exerted an impact greater than that exercised by the corporate tax rate. In the meantime, the size of the estimation coefficient remains similar even when the top statutory tax rate of the central government or of both the central and local governments was used. A 10percent increase in the top statutory personal income tax rate was estimated to cut the economic growth rate by 0.5 percentage points. This clearly contradicts the conclusion of Lee and Gordon (2005), which found no statistical significance of personal income tax. However, considering that all the outcomes of economic activities ultimately belong to individuals, it is natural and reasonable to assume that changes in personal income marginal tax rates would affect the economic growth rate.

On the other hand, the total tax burden,[23] used as a stand-in for the size of the government, was found to exert a negative impact on the economic growth rate in general, but not without statistical significance. The R&D investment rate, which was shown to benefit economic growth in the post-2000 decade, also failed to show statistical significance in the panel analysis, possibly due to the fact that the quality of R&D investment differs by nation.

The panel analysis shows that, while the increase in the size of the government generally does not harm the economic growth of OECD member states, increases in marginal income and corporate tax rates certainly do. Although government spending on productivity enhancements has been

23) The size of each government may have been used instead, but the OECD Statistics did not provide data pertaining to the entire scope of the period of time subject to our analysis. Accordingly, we used the total tax burden as a substitute variable

benefitting economic growth since 2000, the long-term panel analysis does not confirm the effect. In other words, while increases in the corporate tax rate consistently hinder economic growth by affecting the progressive income tax rate and the entrepreneurial spirit, changes in the amounts of fiscal spending impact economic growth differently depending on the given state's phase of development.

〈Table III-5〉 **Panel Regression Analysis of Growth Rates (1981-2012)**

Analysis type	Panel (5)	Panel (6)	IV-Panel (7)	IV-Panel (8)
Corporate tax rate	−0.056 (0.021)**	−0.057 (0.020)**	−0.047 (0.070)*	−0.046 (0.071)*
Income tax rate (central govt.)	−0.035 (0.095)*		−0.053 (0.055)*	
Income tax rate (central + local)		−0.030 (0.135)		−0.053 (0.056)*
Ln (GDP per capita)	−6.877 (0.000)***	−6.936 (0.000)***	−6.510 (0.000)***	−6.560 (0.000)***
Avg. population increase rate	0.030 (0.946)	0.066 (0.882)	−0.050 (0.901)	−0.045 (0.911)
Avg. inflation	−0.021 (0.192)	−0.020 (0.211)	−0.014 (0.381)	−0.014 (0.357)
Avg. trade dependency	0.002 (0.825)	0.003 (0.738)	0.005 (0.659)	0.005 (0.664)
Avg. R&D investment rate	−0.130 (0.749)	−0.012 (0.978)	−0.085 (0.829)	−0.098 (0.803)
Avg. total tax burden	−0.051 (0.403)	−0.044 (0.461)	−0.050 (0.354)	−0.051 (0.351)
N	87	87	88	88
Adj. R-square	0.2176	0.2280	0.2439	0.2257

Notes: 1) The analysis encompasses all three decades, i.e., 1981–1990, 1991–2000, and 2001–2012
2) The dependent variable is the GDP-per-capita growth rate. The fixed-effect model of analysis used herein does not include the constant of each country in the outcome
3) Figures in parentheses represent p-values
4) The asterisks, *, **, and ***, indicate significance levels of 10, 5, and 1percent, respectively

4 Conclusion

In this part, we analyzed how taxes affect the income growth rate. While the demand for government spending on welfare and social services is on rise, there is also an increasing interest in the growth-related effect of the rise in fiscal spending and in tax burdens. According to the classical economic theory, an increase in tax burden－for the purpose of raising revenue for greater fiscal spending－necessarily increases the marginal tax rate, thus distorting or inhibiting the economic activities of businesses and workers and thereby hindering economic growth. How the additional tax revenue is spent can also affect economic growth. In general, any increases in the size of the government are believed to limit or prevent economic growth. However, increases in the amounts of spending on growth-stimulating sectors may promote economic growth in the end. It is based on these economic intuitions that we analyzed the influences of taxes and other fiscal variables on the economic growth of the OECD member states.

First, we included estimations on the sizes of the informal sectors in various countries, made by Schneider et al. (2010), as independent variables in our analysis in order to account for the significant role of the informal sectors in shaping taxpayer behaviors. Taking into account such behaviors enables us to analyze the influences of changing tax rates with greater accuracy. Second, we estimated the average economic growth rate of the OECD member states for each decade in order to capture any possible movements of taxpayers' income from one point in time to another. This division of the time periods subject to analysis also allowed us to take into account such historical experiences as the economic crisis of Northern Europe and the national reunification of Germany. In order to mitigate the tendency of growth paths toward convergence that is tacitly assumed in international comparisons, we also conducted a panel analysis. The panel analysis allowed us to take into account the particularities of different countries, while also observing common patterns of tax and fiscal policies and their impact on economic growth.

Our analysis revealed tax variables as having no statistically significant influence on decade-by-decade economic growth rates. However, when we applied the instrumental variables (controlling the endogeneity in the tax

variables), we did observe parametric estimates in the direction of preventing economic growth, albeit with modest statistical significance. The informal sector variable, included in the analysis of the decade from 2001 to 2012, which supposedly serves as a tax haven for taxpayers, did emerge as a growth-hindering factor in the simple OLS analysis with statistical significance. When the instrumental variables (with endogeneity controlled) were applied, however, the significance of the informal sector also declined. In the OECD member states with relatively well-advanced economies and income levels, the presence of the informal sector may limit economic growth to an extent, but the presence is already too marginal to produce any statistically significant and manifest influences. However, fiscal variables exerted significant influences on the economic growth rates consistently. The size of the government, for instance, was shown to consistently hinder economic growth, with a 10percent increase in the ratio of government spending to the GDP leading to a 0.7percent drop in the GDP-per-capita growth rate per year on average. Conversely, R&D investment mainly served as a growth-promoting factor in our analysis, with a 10percent increase in the ratio of R&D investment to the GDP raising the GDP-per-capita rate by 3to 4percent a year on average. Considering our findings from our analysis of the 1981-1990 decade and the like, we can surmise that the growth-related influences of two variables, namely trade dependency and R&D investment, have been clearly growing over time. The macroeconomic changes worldwide have made trade and technological innovation central to economic growth.

The panel analysis revealed marginal corporate and income tax rates as the two most significant factors holding back economic growth, with the marginal corporate tax rate in particular showing a significance level of 10 percent. The influence of these variables on the economic growth rate, however, took a slight dip when the instrumental variables were used compared with the simple OLS analysis. The estimation shows that a 10percent decrease in the corporate income tax rate would raise the economic growth rate by 0.4 to 0.5 percent a year. This is significant, considering that the GDP-per-capita growth rate of the OECD member states grows at 2percent or so a year on average. On the other hand, the estimate is quite low in comparison with the forecast of 1to 2percent increases made by Lee and Gordon (2005) regarding the 10percent decrease in the

corporate tax rate in a study which dealt with a set of samples that included developed and developing countries alike. Nevertheless, as Lee and Gordon's data set included developing and rapidly growing countries, their estimate does not amount to a contradiction of ours.

The personal income tax rate also showed statistical significance. The statistical significance of this tax rate, which was rather low in the simple OLS analysis, rose significantly when the instrumental variables were used, thus revealing that even the marginal personal income tax rate can serve to hinder economic growth. As a matter of fact, the personal income tax rate exerted an impact greater than that exercised by the corporate tax rate. In the meantime, the size of the estimation coefficient remained similar even when the top statutory tax rate of the central government or of both the central and local governments was used. A 10percent increase in the top statutory personal income tax rate was estimated to cut the economic growth rate by 0.5 percentage points. This clearly contradicts the conclusion of Lee and Gordon (2005), who found no statistical significance in relation to personal income tax. However, considering that all the outcomes of economic activities ultimately belong to individuals, it is natural and reasonable to assume that changes in personal income marginal tax rates would affect the economic growth rate.

On the other hand, the total tax burden, used as a stand-in for the size of the government, was found to exert a negative impact on the economic growth rate in general, but not without much statistical significance. The R&D investment rate, which was shown to benefit economic growth in the post-2000 decade, also failed to show statistical significance in the panel analysis, possibly due to the fact that the quality of R&D investment differs by nation. In other words, while increases in the corporate tax rate consistently hinder economic growth by affecting the progressive income tax rate and the entrepreneurial spirit, changes in the amounts of fiscal spending affect economic growth differently depending on the given state's phase of development.

Ⅳ

Fiscal Policy and Equity: Income Inequality and Economic Growth

1 Introduction[24]

According to a recent OECD report[25], the level of income disparity in OECD member states rose rapidly from the mid-1980s to the first several years of the new millennium, immediately before the onset of the latest global financial crisis. Another OECD report[26] cites that the majority of benefits of economic growth over the last three decades have gone to either the top 1percenters or the top 10 percenters.[27]

The worsening income inequality in many countries has engendered various economic, social, and political controversies, giving rise to a series of protests worldwide, starting with the Occupy Wall Street movement in New York City in 2011. Thomas Piketty, the author of the recent worldwide bestseller, Capital in the *Twenty-First Century* (2013), points to the capital gains rate in

24) A portion of Part Ⅳ of this study has already been published. See Yun Seong-ju, "Inclusive Growth Is the Way to Economic Growth: Focusing on Income Inequality," *Fiscal Forum*, July 2014

25) OECD(2013b)

26) OECD(2013a)

27) In countries like the United States, Canada, and the United Kingdom, persons making up the top 10 income percentile claimed over 50 percent of the fruit of economic growth. In countries like the United States, Canada, the United Kingdom, Australia, and New Zealand, the top one percenters claimed over 20 percent of the fruits of economic growth

excess of the economic growth rate as the main culprit for the worsening income inequality in various countries around the world. There is also a rising number of studies demonstrating the repercussions of income inequality on economic growth.

The state can mitigate or prevent the negative influences of income inequality on economic growth by enacting and enforcing fiscal policies that address income inequality. In this part, we survey the types of fiscal policy measures that governments may adopt with respect to income inequality, and examine Korea's experience using income inequality data.

2 Policy approach to mitigating income inequality

We can think of income inequality as both a cause and an outcome of economic growth. Economic growth may engender income inequality, and income inequality may exert sustained influences on economic growth. The state may introduce either of the two measures of market intervention in order to ensure sustainable economic growth in the face of income inequality.

First, economic growth may give rise to income inequality in the market. When the size of such inequality remains marginal, it may even benefit economic growth. However, when income inequality in the market economy exceeds a certain point, it can dramatically increase social conflicts, political instability, and investment uncertainties, thus exerting negative influences on the prospects of economic growth in the long run. In response, the state generally introduces income redistribution policy measures, including additional taxes and spending programs. Intervening in the market so as to mitigate the inequality of disposable income, the state aims to minimize the negative influence and maximize the positive influence of income inequality.[28)]

Second, and alternatively, the state may opt to intervene in the market before economic growth leads to significant income inequality. This can be achieved by increasing the opportunities by which economic actors of all classes

28) For specific examples, see IMF (2014)

and sectors, including the poor, can partake of the growing economy by enhancing their access to public education, healthcare, and other services. This approach to income inequality is intended to mitigate inequality over a longer span of time than is the income redistribution policy discussed above, as it takes time for the government investment in the development of human capital to begin to produce tangible results. The recent term for this approach to income inequality is the "inclusive growth policy."[29] Inclusive growth envisions sustainable economic growth based on the equality of opportunity. As such, it emphasizes the institutional support that the state is to provide to ensure equal participation by all—particularly the poor—in the given economy.

3 Empirical analysis

A. Income inequality and economic growth in Korea

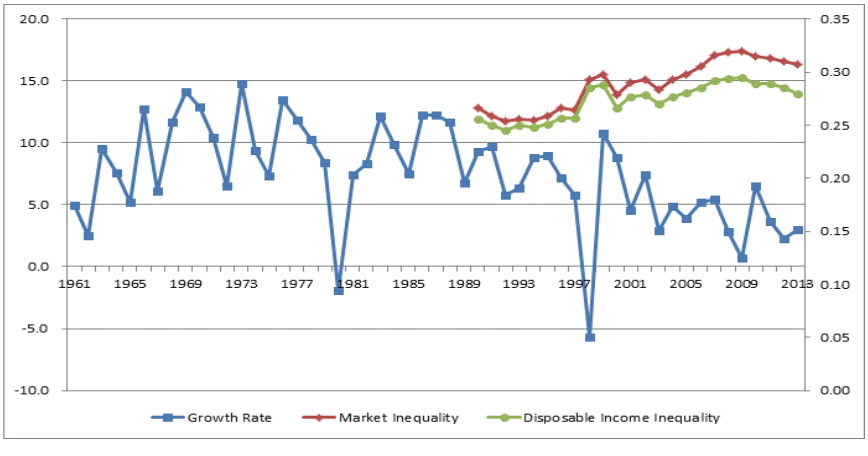
Statistics Korea's household trend surveys show that the level of income inequality has been rising steadily in Korea since 1992. While the Asian Financial Crisis in the late 1990s did serve to rein in income inequality abruptly, it nonetheless recovered to its previous level in just two years (by 2000). The rise of income inequality began to slow down circa 2008 and 2009. However, the P90/P10 indicator,[30] encompassing all households, has weakened somewhat and remained constant since 2008, indicating that the income gap between the haves and have-nots remains wide.

29) There is as yet no consensus on the concept and definition of inclusive growth. However, a number of studies emphasize a few key common points. In inclusive growth, all economic actors are guaranteed equal opportunities to contribute to economic growth. The tangible and intangible benefits of economic growth, in turn, are to be distributed equitably to all members of the society. To this end, the government ought to design and implement various policy measures – of income redistribution, labor, healthcare, education, environmental protection, etc. – thereby ensuring the continual creation of jobs and sustainable economic growth, while also inducing further economic growth by ensuring a fair distribution of benefits to all. The government, moreover, ought to enhance the social security net so as to support the dignity of persons who, despite the institutional support and settings, are incapable of escaping poverty (Ali and Son, 2007; Stuart, 2011; OECD, 2013a)

30) The Px/Py ratio is the ratio of upper bound value of the xth decile to that of the yth decile

In the meantime, the ratios of P60, P70, P80, and P90 to P50have also remained constant for long stretches of time, indicating the income gap along class lines remains steady. The income gap becomes all the wider and more manifest along the high-income class boundary value than along the low-income counterpart, reflecting that the income gap grows wider toward the top of the income hierarchy. Overall, the level of income inequality among all households remains high and above the level of income inequality among urban households of two or more members,[31] pointing to the more severe income inequality among households outside rural areas and single households than among urban households of two or more members.

[Figure IV-1] **Economic Growth and Income Inequality**



Note: The measures "market inequality" and "disposable income inequality" concern members of urban households of two or more members

Source: KOSIS, Penn World Table (PWT) 7.1

From 1991 to 2012, the absolute size of the correlation between Korea's

31) The differentials between the P70/P50 index and the P60/P50 index, between the P80/P50 index and the P70/P50 index, and between the P90/P50 index and the P80/P50 index amounted to 0.15, 0.18, and 0.33, respectively. Note, in particular, the great differential between the P90/P50 index and the P80/P50 index

economic growth rate at time t and Korea's income inequality level at time t-1 remained between 0.20 and 0.28, which is by no means excessive. Note, however, that the Gini coefficient, the P90/P80 index, and the P80/P20 index during the same period of time are inversely correlated to the economic growth rate, while the median 50 to 150percent ratio, indicating the ratio of the middle class, is positively correlated with the economic growth rate. These findings imply that income inequality may have exerted a negative impact on Korea's economic growth.

However, we need data from a longer time series in order to determine the exact nature of the correlation between economic growth and income inequality in Korea. The Korean economy began to grow dramatically in and after the 1960s, before slowing down somewhat by the late 1980s. The foregoing paragraphs concern data gathered since the early 1990s or so, and may not accurately represent how the correlation between economic growth and income inequality has evolved in Korea.

As Figure IV-1 shows, Korea's economic growth rate has been declining steadily since 1990, while its income inequality has been on a constant rise. The inverse relation between the two is not surprising. However, we need to infer how income inequality evolved in Korea from 1960 to 1990. When Korea was still early in its economic development phase in the 1960s, the vast majority of Koreans were poor, thus keeping the nationwide level of income inequality quite low. As the Korean economy began to grow and expand at an astonishing pace, however, a few began to benefit from it far more than the many, thus raising the level of income inequality to 0.26 by 1990. In other words, the level of income inequality could well have been rising alongside the economic growth rate during Korea's heyday of economic development, with the two variables thus interlocked in a positive correlation.

B. Inclusive growth

Although inclusive growth extends to various sectors and aspects of society, this study focuses specifically on the concept's implications for education and healthcare, which are the two areas of social services closely related to income inequality and economic growth. While anaccess-centered analysis can

reveal much about the idea of inclusive growth in practice, it omits information on income-dependent levels of spending. Therefore, we combine our access-centered analysis with another analysis on people's use of social services according to their income levels.

1) Education

In Korea, middle school education is mandatory. This means, then, that everyone has access to middle school education irrespective of family income. In reality, it is university education that exerts enduring influences on income inequality. Furthermore, Korean parents spend sizable amounts of money on securing private tutorial and learning arrangements for their children in the belief that doing so will help their children enter decent colleges. Parents' income, in other words, has emerged as a decisive predictor of their children's future income by way of private education. It is therefore worthwhile to explore the policy implications of inclusive growth regarding opportunities of private education.

Our empirical analysis is based on data from 2001 and 2011 found in the Korean Labor and Income Panel Study (KLIPS). Our samples consist exclusively of households with wage earners.[32] We divided these wage-earning households into 10 percentile groups based on the total amounts of wages they earn. Then we singled out households with children who have not yet entered colleges as samples for our analysis of inclusive growth. Figure IV-2 shows the trajectories of inclusive growth (in the form of opportunity curves) observed in 2001 and 2011.[33]

The opportunity curve of 2011 hovers above that of 2001 at every point, indicating that the access of all classes to private education has increased over a decade or so.

32) 3,721 households in 2001, and 5,634 households in 2011.

33) For discussions of the methods used in our analysis (e.g., the opportunity curve, the opportunity index, the equity index of opportunity, etc.), see Ali and Son (2007)

[Figure IV-2] **Inclusive Growth: Opportunity Curves**

2.1 Private Education Access **2.2 Healthcare Access**

However, the fact that both curves draw upward toward the right also indicates that the greater the household income, the greater the access to private education. In other words, the distribution of opportunity still remains unequal. The fact that such an unequal distribution has persisted throughout the decade also indicates that inclusive growth has not produced tangible improvements in the equality of private education.

Next, we apply the equity index of opportunity (EIO) to track and identify specific changes that occurred between 2001 and 2011. The average EIOs for the entire society in 2001 and 2011 were 0.7208 and 0.7746, respectively.[34] As Figure IV-2.1 shows, the EIO of 2011 is higher than that of 2001 by 0.0538. The opportunity indexes (OIs), covering the area below each opportunity curve, were 0.5853 and 0.6485 for 2001 and 2011, respectively,[35] with the OI for 2011 larger than that for 2001 by 0.0633. Using the society-wide average EIOs and OIs, we can estimate the EIOs for the two years as follows:

34) $\bar{y}_{edu,2001} = 0.7208,\ \bar{y}_{edu,2011} = 0.7746$

35) $\bar{y}_{edu,2001} = 0.5853,\ \bar{y}_{edu,2011} = 0.6485$

$$\phi_{edu,2001} = \frac{\bar{y}^*_{edu,2001}}{\bar{y}_{edu,2001}} = \frac{0.5853}{0.7208} = 0.8120,$$

$$\phi_{edu,2011} = \frac{\bar{y}^*_{edu,2011}}{\bar{y}_{edu,2011}} = \frac{0.6485}{0.7746} = 0.8372$$

The EIOs for 2001 and 2011 are 0.8120 and 0.8372. The fact that these figures fall below one indicates that the distribution of opportunities is not yet equal in Korea. Yet the increase in the figure by 0.0252 over the decade also means that the level of equality has improved somewhat－more specifically, by 5.38 percentage points as for opportunities throughout society, and by 18.07 percentage points for the first group in particular, which is the lowest-income group.

Inequality may have subsided in terms of access, but we need also to analyze the patterns of different income groups' spending on private education for more in-depth understanding. Using the same set of samples,[36] we were able to observe that, the greater the household income, the greater the spending on private education. Whereas households in the first group spent KRW 29,700 and KRW 67,500 on the private education of their children in 2001 and 2011, respectively, the tenth group spent KRW 260,700 and KRW 438,700, respectively, at the same time. In other words, the first group's spending grew by a mere KRW 38,800 over a decade while the tenth group's soared by KRW 178,000 during the same time period. So even though poor households' access to private education for their children may have increased over the decade, the quality of private education－represented by the amount of spending－remains unequal.

2) Healthcare

We applied the same set of samples from our analysis of private education in our analysis of healthcare services in order to determine the progress of inclusive growth in reality.

Figure IV-2.2 shows the status of inclusive growth with respect to

36) Estimates are based on only the number of households with children

healthcare, in the form of opportunity curves. The opportunity curve of 2001 draws downward toward the right, which means that access to public healthcare becomes stronger as the household income lowers. On the contrary, the opportunity curve of 2011 takes a slight dip before rising upward again toward the right. The curve remains relatively evenly balanced between the left and the right. This indicates that the access of the wealthy to public healthcare has grown stronger in comparison to the access of the poor. However, the fact that the opportunity curve of 2011 hovers above that of 2001 also means that everyone's access to public healthcare has improved over 10 years.

Next, we analyzed the EIOs to identify the status of the equality of opportunity in access to public healthcare. The equality of opportunity of 2001 and 2011 amounted to 0.7794 and 0.9100, respectively,[37] having increased by 0.1307 in 10 years. The OIs for the 2 years also reached 0.7781 and 0.8990, respectively,[38] with the figure for 2011 significantly higher than that for 2001. However, the EIO for 2001, based on these two foregoing estimates, was 0.0105 higher than that for 2011.

$$\phi_{med,2001} = \frac{\bar{y}^*_{med,2001}}{\bar{y}_{med,2001}} = \frac{0.7781}{0.7794} = 0.9984,$$

$$\phi_{med,2011} = \frac{\bar{y}^*_{med,2011}}{\bar{y}_{med,2011}} = \frac{0.8990}{0.9100} = 0.9879$$

While the EIOs remained below one in both 2001 (0.9984) and 2011 (0.9879), the figures are still quite near one, indicating that all income classes in Korea enjoy almost equal access to public healthcare services. However, the fact that the EIO took a slight dip between 2001 and 2011 also signifies that the equality of access has weakened somewhat. This is also apparent in the fact that the gap between the opportunity curves of 2001 and 2011 is smaller

37) $\bar{y}_{edu,2001} = 0.7794,\ \bar{y}_{edu,2011} = 0.9100$

38) $\bar{y}_{edu,2001} = 0.7781,\ \bar{y}_{edu,2011} = 0.8990$

between the lower percentile groups than between the higher ones.

The analysis of the spending on healthcare revealed that the level of spending increased in all income groups in the decade between 2001 and 2011. However, the margin of increase was most prominent in the lowest income (first) group, while the level of spending remained relatively constant in the highest income (tenth) group. As a matter of fact, the slope of the spending curve begins to slow down in the sixth group and higher. While the ratio of healthcare spending to wage increased from 1.75 percent to 2.50 percent in the first group, the margin of increase is not as steep beginning in the second group, indicating that the first group has been spending increasingly more on healthcare than other income groups. This may signify that members of the first (lowest income) group may be more prone to illnesses and other medical conditions than other groups. This may also limit the ability of the group's members to partake of economic growth in general.

Access to public healthcare remains relatively equally distributed across all income groups in Korea as the Korean National Health Insurance and public medical benefits serve people of all classes. Nevertheless, the fact that lower income groups spend greater portions of their wages on healthcare than their higher-income counterparts also forces Korean policymakers to find ways to improve not only the accessibility, but also the quality, of public healthcare services in the country.

4 Conclusion

In Part IV, we explored the correlation between fiscal policy and equity in terms of economic growth and income inequality. The current consensus in the literature is that income inequality can both promote and prevent economic growth. Given the high level of disposable income inequality in Korea, however, the current level of income disparity, if left unmitigated, is likely to limit Korea's economic growth in the future. In order to ensure sustainable economic growth, the Korean government needs to introduce fiscal policy measures that intervene in and alleviate income inequality.

The Korean government may intervene in the current status of income

inequality using income redistribution measures in the short run, and espousing and promoting inclusive growth in the long run. The government's income redistribution measures will affect and shape the behavior of economic actors, exerting both positive and negative influences on the short-term prospects of Korea's economic growth. Therefore, policymakers also need to devise new institutional settings, suited to Korea's conditions, which can minimize the harm while maximizing the benefits. A recent IMF report (2014) provides a list of possible measures to consider, including: reinforcing the eligibility criteria for selective benefits; differentiating benefits by income level; converting price support into direct grants or cash transfers; increasing out-of-pocket expenses; streamlining tax reduction and exemption measures; and readjusting the margins of the tax system.

Statistics show that the level of inequality in Korea has been worsening since 1992, requiring both short-term fiscal adjustments and long-term policy interventions. Our empirical analysis on the implications for inclusive growth show that, notwithstanding the apparent lack of inclusive growth stances in public healthcare, the EIOs from 2001 and 2011 stay close to one, indicating that people of all classes in Korea enjoy almost equal access to public healthcare services. The statistics on private education show that the EIO improved between 2001 and 2011, revealing that the access of lower-income groups to private education has improved more than the access of higher-income groups. However, lower-income groups still fall significantly behind in terms of both access to and spending on private education for their children. The spending gap between the higher and lower income groups, if anything, has grown even wider. The inequality of opportunity and quality in education along the income/class line will likely contribute to the calcification of income inequality in Korea in the future. The Korean government therefore needs to intervene in the situation with proper policy measures intended to enhance the equality of opportunity in education, even by curtailing private education if necessary.

Finally, the Korean government will need to ensure fiscal stability and sustainability first before finding and implementing its equality-improving measures. In order to ensure the sustainability of both economic growth and policy measures, policymakers need to devise and administer policies from not political, but economic, perspectives.

V

Conclusion

The recent global financial crisis has ushered in a paradigm shift in terms of the role of fiscal policy, prompting diverse new studies on a wide range of related topics and aspects. In the meantime, policymakers in numerous states, charged with the tasks of deciding and enforcing actual policy measures, are struggling to find the right measures amid the flood of conflicting information and opinions. While numerous states have immediately responded to the global financial crisis by making massive fiscal investments, policymakers are now facing ever-increasing confusion regarding which policy stance to adopt in an atmosphere where the inflation rate has plummeted and the pace of economic recovery remains far too slow.

For the last five to six years following the onset of the global financial crisis, the recovery of fiscal stability has been the top-priority goal of governments in many states around the world. The majority of states worldwide have sought to cope with the crisis through introducing massive stimulus packages－a move which has led, inevitably, to mounting deficits and soaring debt levels. This situation has given rise to an international consensus on the crucial need to secure, expand, and maintain a sufficient fiscal space in normal times in order to cope with possible external shocks to the structures of domestic economies. International organizations began to emphasize the need to switch to new fiscal policies intended to restore normalcy to the deteriorating fiscal balances. Accordingly, states coping with the crisis on their own began to introduce new contractionary measures; while those who failed to cope with the crisis on their own were forced to resort to assistance from international

organizations, and thereby compelled to implement contractionary measures. Over the last several years, researchers have therefore debated which type or types of contractionary measures were most effective in restoring fiscal stability. However, as increasingly more people have begun to voice skepticism regarding the suitability and effectiveness of these measures, a new set of complex questions face researchers and policymakers. For instance, the expansion of governmental support for low-income households during the crisis may have served to stem the deterioration of income inequality and to maintain the total demand constant, but its withdrawal now is replete with risks of reducing total demand and of slowing down the process of economic recovery. However, leaving such support intact may serve to invite continuing criticisms demanding fairness.

This study explored the true role and function of fiscal policy in the post-financial crisis world, surveying the current fiscal situations worldwide and summarizing a broad array of arguments and positions that have been recently put forward. More specifically, this study examined whether the recent turn by governments toward a more growth-friendly policy has been effective, and how such a policy squares with other important concerns of fiscal policy, such as distributive equity and macroeconomic stability. We surveyed the status of macroeconomic stability and distributive equity in the post-financial crisis world, and how recent fiscal policy measures have affected these conditions, requiring policymakers to consider various and at times conflicting goals of fiscal policy simultaneously from a broad-ranging perspective. However, we also emphasized economic growth as the first and foremost necessary condition that must be satisfied in order for other fiscal reforms to succeed.

In Parts II and III, we provided more in-depth discussions of the two main pillars of fiscal policy, i.e., fiscal spending and taxation, and their instrumental roles in promoting economic growth. We categorized different types of fiscal spending by function, and in Part II provided theoretical and empirical analyses of the growth-promoting effects of these types. The theoretical consensus in the literature is that the adjustment of the ratio of different types of fiscal spending may indeed promote economic growth, depending on the relative productivity of the given spending categories. Even an absolute increase in the total amount of fiscal spending may promote economic growth so long

as its productivity exceeds the cost of distributing fiscal resources. In our empirical analysis, we used OECD statistics on the member states and rearranged the classification of fiscal spending in the COFOG to group similar spending categories into a few larger categories－core administrative spending, infrastructure spending, external spending, and income-redistributing spending－ and analyzed their effects. The categories of spending listed on the COFOG do not unilaterally aim to promote economic growth as the foremost or only goal. Nevertheless, our analysis did reveal that the structure of fiscal spending in Korea is heavily biased in favor of infrastructure, and shows little interest in redistribution, in comparison to the OECD average. Although this structure is likely to evolve and change in the future, the non-linear correlation between infrastructure and economic growth, as demonstrated in the literature, may imply that investment infrastructure beyond the growth-optimizing level may indeed hinder economic growth.

In Part III, we analyzed how changes in tax burdens and fiscal variables affect income growth rates. According to economic theory, an increase in tax burden raises the marginal tax rate, thus distorting or inhibiting the economic activities of businesses and workers and consequently harming economic growth. However, how the additional revenue from increased taxes is spent may also promote economic growth. Our empirical analysis of the OECD member state statistics also included estimates on the sizes and presence of informal sectors in each member state so as to capture and analyze the real impact of changing tax rates. We also conducted a panel analysis on how the economic structures of these member states have changed in each of the three decades subject to our analysis. In our decade-by-decade analysis of growth rate factors, we observed the slight growth-inhibiting impact of rises in marginal corporate, personal income, and overall tax rates when we controlled for endogeneity. On the other hand, fiscal variables, such as the size of the government and the R&D investment, turned out to exert far more significant influences on economic growth.

In Part IV, we explored the implications of growth-promoting policies on social equity and fairness. Social equity is one of the three overarching objectives of fiscal policy, and the possible conflict between this goal and economic growth must be considered in making fiscal policy decisions. The

established literature notes that income inequality can be both beneficial and harmful for economic growth. There is also a consensus that excessive income inequality can be a limit on long-term and sustainable economic growth. Policymakers therefore will be increasingly required to find and introduce new institutional measures that minimize the negative consequences of redistribution, while maximizing the positive impact on economic growth. Our analysis of statistics in Korea show that, while the ideal of inclusive growth has made much progress in the area of public healthcare, the situation is hardly the same in the area of education. As income-dependent inequality in education can further contribute to the calcification of the class hierarchy and inequality, the Korean government needs to intervene in this matter actively.

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