

Tax Policy in Slow Growth Era (1): Harmonization with Redistribution Policy

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I

Introduction

Korea's growth rate has been decreasing gradually as a result of two economic crises, rapid economic growth and population aging. This decline in the growth rate has been accompanied by a decline in the country's potential growth rate, which has been driven by the decline in total-factor productivity (TFP), slowdown in capital accumulation, and decrease in potential labor. Specifically, the decline in the potential growth rate during the period from 2016 to 2020 is attributable to 0.2%p declines each in TFP, capital stock, and potential labor. Among these, the decrease of potential labor was the highest. Because the country's working age population is expected to decrease in the future, as population aging accelerates, the potential growth rate is expected to decline at a faster pace. As the economic growth rate falls, the unemployment rate increases, especially among young people entering the labor market, which is widening the income gap among economically active people. Specifically, the unemployment rate of people aged 15 to 29 has been rising rapidly since 2010, while the economic growth rate has been clearly declining. On the other hand, the increase in the total unemployment rate has been minimal. This shows that the economic impact of slowing economic growth disproportionately affects the younger generation. Unemployment at the time of labor market entry can lead to long-term loss of human capital, thereby lowering lifetime incomes and increasing welfare dependency. In the long term, this can place a significant burden on welfare financing.

Meanwhile, the decline in the economic growth rate hampers income mobility and widens the income gap between those who successfully entered the labor

market and those who did not. In addition, as the decline in the growth rate lowers labor demand, the unskilled workers are mainly hurt, thereby widening the income gap. Those most negatively affected by this are low-skilled, poorly educated, and aged workers. The trend of decreasing average size of households may also worsen income inequality.

Furthermore, the slowdown in economic growth makes it increasingly difficult for the government to secure the tax revenue it needs, increasing the need for active funding and effective expenditure management in the future. Considering this change in the economic environment, this study examines the harmonization of the financing and redistribution functions that the tax policy should pursue in the current period of low growth. Securing revenue is a necessary condition for the government to function properly, and redistribution has recently been emerging as one of the most important roles of the government.

II

Tax Policy of Foreign Countries in Low Growth Era

As the economy grows, it gradually approaches a steady state, and the growth rate stagnates. Although the growth rate is in decline, the level and persistence can have significant impacts on the national economy. In this chapter, we examine the trend of the decline in the potential growth rates of 24 OECD member countries and compare their situations to that of Korea. In addition, we examine these countries' fiscal management such as tax revenues, expenditures during the periods in which their potential growth rates declined.

1 Stylized Facts During the Declining of Potential Growth Rates of OECD Countries

Based on the real GDPs of the 24 OECD countries, the potential GDPs and potential growth rates were estimated using a Hodrick-Prescott filter (HP filter).¹⁾ These data were then used to examine the decline in the potential growth rate of each country, and the start and end of the decline and annual average decline rate in the period of decline were calculated. The longest period of potential growth rate decline in the past and most recent period of decline were also analyzed. It was found that, during the longest period of decline, Korea's potential GDP growth rate fell by 6.1%p over the 28-year period from 1987

1) The source of the real GDP data is the World Bank National Accounts Data, based on U.S. dollars as of 2010.

to 2015. This is the third largest decline after Greece (7.0%p) and Italy (6.2%p). During Korea's longest period of decline, the annual average potential growth rate fell by 0.22%p, recording the eighth largest drop among the 24 OECD countries.

It should be noted that Korea's potential growth rate is still declining, raising concern over the persistence of the longest-ever period of decline in the country's potential growth rate. Besides Korea, Italy and Luxemburg are the only countries that are currently experiencing their longest period of decline in potential growth rate, as of 2015. Excluding these three countries, the recent decline in potential growth rate is not like the previous longest growth decline period.

In terms of the magnitude of the potential growth rate decline, Italy is the country most similar to Korea, and the potential growth rates of our two countries are still in decline. Greece, Portugal, and Spain are similar to Korea as well. Japan is somewhat similar, but the decline of its potential growth rate seems to have stopped in 2009, while that of Korea is ongoing. However, it is interesting that the real GDP per capita of Japan during the country's longest period of decline (1961~1979) is very close to that of Korea during our longest period of decline.

〈Table II-1〉 Periods of Potential GDP Growth Rate Decline in OECD Countries

Country	Longest period of decline in country's history (growth rate, %)	Total Decrease (%p)	Annual average decrease (%p)	Recent period of decline (growth rate, %)	Total Decrease (%p)	Annual average decrease (%p)
Korea	1987(9.4)~2015(3.3)	6.1	0.22	Same as before		
United States	1962(4.9)~1980(2.9)	2.0	0.11	1997(3.5)~2010(1.4)	2.11	0.16
Japan	1961(9.6)~1979(4.0)	5.6	0.31	1986(4.3)~2009(0.5)	3.85	0.17
Spain	1961(7.7)~1981(1.8)	5.9	0.29	2000(3.7)~2014(-0.2)	3.9	0.28
Greece	1964(7.7)~1985(0.8)	7.0	0.33	2000(3.8)~2015(-3.5)	7.24	0.48
Portugal	1967(6.8)~1983(2.7)	4.1	0.25	1989(3.6)~2014(-0.7)	4.36	0.17
Italy	1961(5.4)~2015(-0.8)	6.2	0.12	Same as before		
Australia	1966(5.2)~1980(2.8)	2.4	0.17	1999(3.7)~2015(2.7)	1.07	0.07
Austria	1968(4.8)~1983(2.0)	2.8	0.19	1996(2.6)~2015(0.9)	1.70	0.09
Belgium	1962(4.9)~1983(1.8)	3.1	0.15	1998(2.4)~2015(1.0)	1.40	0.08
Canada	1962(5.6)~1991(2.1)	3.5	0.12	1999(3.3)~2010(1.7)	1.58	0.14
Chile	1961(4.3)~1974(1.4)	2.91	0.22	1992(7.5)~2015(3.8)	3.69	0.16
Denmark	1961(4.6)~1980(2.1)	2.54	0.13	1997(2.5)~2012(0.1)	2.4	0.16
Finland	1969(4.5)~1991(1.5)	3.03	0.14	1999(3.7)~2015(-0.1)	3.75	0.23
France	1962(5.7)~1983(2.2)	3.48	0.17	1999(2.3)~2015(0.7)	1.62	0.10
Iceland	1974(5.6)~1991(1.5)	4.02	0.24	2002(4.1)~2013(1.5)	2.61	0.24
Israel	1968(8.6)~1983(3.6)	4.94	0.33	1994(5.5)~2003(3.7)	1.77	0.20
Luxemburg	1998(5.1)~2011(2.2)	2.86	0.22	Same as before		
Mexico	1963(7.2)~1986(2.0)	5.16	0.22	1997(3.2)~2009(2.2)	0.92	0.08
Netherlands	1964(5.8)~1981(1.6)	4.18	0.25	1997(3.4)~2014(0.5)	2.81	0.17
Norway	1973(4.5)~1988(2.8)	1.7	0.11	1996(3.5)~2011(1.2)	2.32	0.15
Sweden	1961(4.6)~1979(1.8)	2.77	0.15	2000(3.1)~2012(1.6)	1.45	0.12
Turkey	1965(6.0)~1980(3.5)	2.42	0.16	1987(4.7)~1999(3.5)	1.2	0.1
United Kingdom	1966(3.3)~1979(1.9)	1.32	0.10	1999(2.9)~2010(1.1)	1.82	0.17

〈Table II-2〉 Income Changes During the period of Potential Growth Rate Decline

(Unit: USD, as of 2010)

Country	Period of decline in the past	Real GDP per capita	Average over the period	Recent period of decline	Real GDP per capita	Average over the period
Korea	1987	6,953	15,957	Same		
	2015	25,023				
United States	1962	17,910	23,807	1997	40,966	46,436
	1980	28,734		2010	48,374	
Japan	1961	9,396	17,695	1986	31,062	40,442
	1979	24,986		2009	42,725	
Spain	1961	8,156	13,869	2000	28,551	30,404
	1981	17,303		2014	29,595	
Greece	1964	8,932	15,493	2000	23,277	25,825
	1985	18,709		2015	22,573	
Portugal	1967	6,852	10,525	1989	16,019	20,352
	1983	12,588		2014	21,537	
Italy	1961	11,682	27,259	Same		
	2015	33,849				

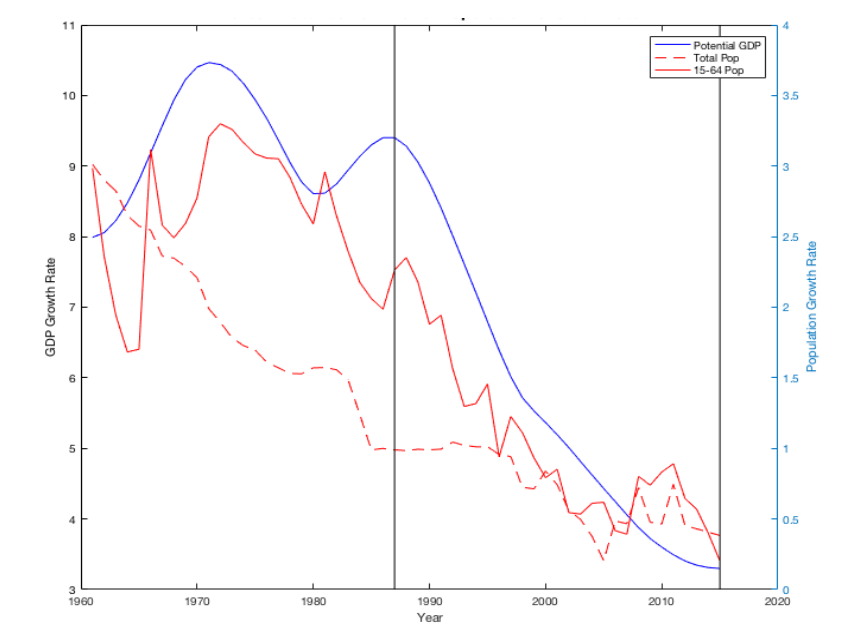
2 Korea

Korea's potential GDP growth rate declined steadily after reaching 9.4% in 1987, falling to 3.3% in 2015. Over this 28-year period, the rate fell by 6.1%p, recording an annual average decrease of 0.22%p and marking the longest period of decline in the potential GDP growth rate in Korea's history. The main reason for this decline is slowing population growth, which is easily identified on the [Figure II-1]. During the period from 1987 to 2007, the decline in the growth rate of the working age population (15-64 years old) is particularly notable, showing a similar trend as the potential GDP growth rate.

Korea's adjusted labor income share (labor income and income of self-employed workers / nominal GDP) has been decreasing gradually over time. In terms of tax revenue, the shares of personal income tax, corporation tax, and property tax have increased, on average, during the current period of potential

growth rate decline, with the share of the GDP showing the same pattern. Meanwhile, the share of consumption tax, which is the tax revenue on goods and services, declined during the same period and increased during other periods. As for social security contributions, considering the fact that they were introduced in Korea after the financial crisis in 1997, it is not meaningful to compare their average levels during the period of potential growth rate decline and other periods.

[Figure II-1] Korea: Potential Growth Rate and Population Growth Rate



Note: The left axis is the potential growth rate, while the right axis is the population growth rate. "Potential GDP" is the potential growth rate, "Total Pop" is the total population growth rate, and "16-64 Pop" is the growth rate of the working age population.

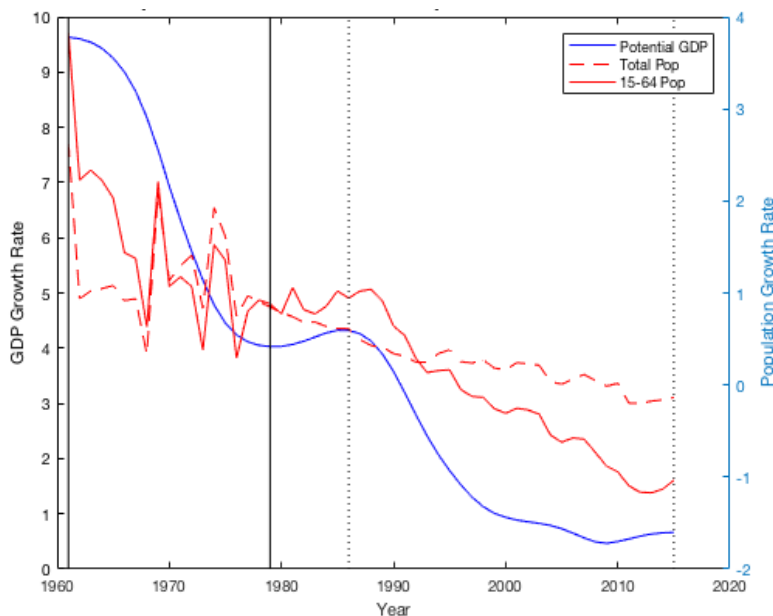
3 Japan

After peaking at 9.6% in 1961, Japan's potential growth rate declined steadily until reaching 4.0% in 1979, recording a decrease of 5.6%p over an 18-year

period (or an average annual decrease of 0.31%p). Since 1979, the most recent period of decline in the country's potential growth rate was from 1986 (4.32%) to 2009 (0.47%). During this 23-year period, the potential growth rate fell by a total of 3.9%p (or an annual average 0.17%p). Although the size of the recent drop was smaller than that of previous one, the recent had a more significant impact on the economy because it occurred when the growth rate was already low and lasted for longer period. Since then, Japan's potential growth rate has risen slightly, reaching 0.66% in 2015.

The recent decline in the potential growth rate is consistent with the decline in the population growth rate. In particular, the working age population growth rate has been declining since the 1990s, which has been a major factor of the decline in the potential growth rate.

[Figure II-2] Japan: Potential Growth Rate and Population Growth Rate



Note: The left axis is the potential growth rate, while the right axis is the population growth rate. "Potential GDP" is the potential growth rate, "Total Pop" is the total population growth rate, and "16-64 Pop" is the growth rate of the working age population.

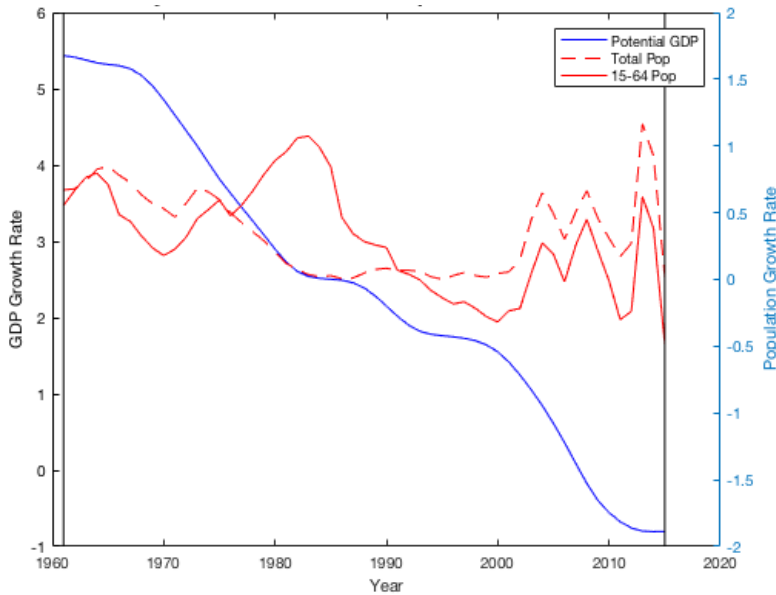
The share of labor income increased during the period of potential growth rate decline in the past, but it has been declining during the most recent period of decline. When comparing the period of potential growth rate decline and period of non-decline, no significant differences in tax revenues for each item and government spending by purpose were found. In Korea, the share of income tax, social security contributions, and property tax is high during the period of decline, while the share of consumption tax is high during the period of non-decline. Japan, however, does not show such a difference.

4 Italy

The potential growth rate of Italy declined steadily from 5.4% in 1961 to 0.8% in 2015, marking the longest period of potential growth rate decline, at 54 years, in the country's history and the longest period of decline among the 24 countries analyzed. During this 54-year period, Italy's potential growth rate fell by 6.2%p, or an annual average of 0.12%p, and it is still in decline today. In Italy, unlike Korea and Japan, other factors are playing an important role in this decline, because the relationship between the slowing of the country's population growth and decline in its potential growth rate is not clear.

During the period of potential growth rate decline, the share of labor income declined steadily as well. Since 2000, however, it has been increasing at a modest rate. The trend of labor income share is similar to the trend of the rate of increase in the working age population. Also, government revenue has risen sharply since 2005, and government spending has increased significantly since 2009. This implies that the sharp increase in government spending has been possible after the recovery of government revenue was confirmed.

[Figure II-3] Italy: Potential Growth Rate and Population Growth Rate



Note: The left axis is the potential growth rate, while the right axis is the population growth rate. "Potential GDP" is the potential growth rate, "Total Pop" is the total population growth rate, and "15-64 Pop" is the growth rate of the working age population.

5 Conclusion

By analyzing the potential growth rates of OECD countries, we have confirmed that declining potential growth rates is a common trend. Korea is now experiencing the same low potential growth rate that other developed countries have already seen. However, it is of great concern that the growth rate in Korea has fallen larger than the rates in other developed countries and that it has been falling for such a long time. Moreover, given the fact that the potential growth rate has been declining continuously while the real GDP per capita has not reached a level as high as it did in the United States or Japan, we need to address slow growth trend.

The decline in potential growth rate experienced by OECD countries is consistent with the decline in population growth. As labor is a component of the production function, a decline in population growth contributes to a decline in the potential growth rate. In addition, with such a lowered growth rate, the typically high birthrate of the past is no longer possible. Under these circumstances, raising the potential growth rate will not be easy. Rather than increasing the potential growth rate, a more realistic approach for policymakers to take would be to slow the rate of decline by boosting productivity, improving labor quality etc.

To this end, fiscal policy designed to simply adjust the structure of revenue and expenditure would not be sufficient. First, we need to clarify the direction of the economy amid the global trends of low growth and population aging and slowing growth. It is important to develop means responding to the slowdown in population growth, which is a major cause of the decline in the potential growth rate, while considering ways to mitigate the effects of population decline. Most developed countries have failed to prevent their potential growth rates from declining, which is mainly the result of slowed population growth. Therefore, it is important to clearly identify all possible responses available to the government by assessing various policy options, such as securing growth drivers by achieving innovation and improving the quality of labor and capital.

III

Effects of Population Ageing on Tax Policy

1 Background

Since experiencing two economic crises, Korea has seen its growth rate decline. This chapter analyzes the impact of changes in demographic structure, which have been pointed to as a major cause of low growth, on tax revenue and tax policy. By analyzing household survey data, Sung (2015) showed that most of the low-income brackets consisted of elderly households. In particular, the share of elderly households in the first quartile (over 60 years old) has been increasing rapidly, reaching 82.2% in 2014. That share is expected to soon reach almost 90%. This growing share of elderly households, as a result of population aging, and the large proportion of low-income brackets occupied by elderly households will have significant impacts on future tax revenue.

2 Population and Household Structure Changes

Population aging refers to the phenomenon where the proportions of the elderly population and elderly households of a country increase. Population aging in Korea is accelerating as citizens' lifespans increase with the improvement of medical technology. However, due to the country's low fertility rate, the birth rate is also falling, accelerating population aging. It is predicted that, in the future, Korea's elderly population will eventually become the largest age group

in the country. According to Statistics Korea, the population aged 80 years or older is expected to become the largest age group by 2065.

According to analyses, the recent demographic changes have been accompanied by a trend toward smaller family. The numbers of single, unmarried household heads and single-person households created by divorce or bereavement have been increasing, and the lifespan of single-person households has been extended. With single-person households having attracted more and more mainstream attention, views on household types have been changing. The average size of households, including single-person households, has been declining rapidly, falling from 3.0 persons in 2006 to 2.75 persons in 2014.

3 Impact on Income Distribution

As mentioned earlier, population aging refers to the growing proportion of elderly people in a society. Among the old, the majority of people can be categorized as retirees, unemployed, or economically inactive. It is also known that, all the other else being equals, retired and jobless households have lower income levels than other households. Therefore, population aging also tends to increase the share of low-income households.

According to Sung (2003), the Gini coefficient for each age group is positively correlated to the age of the household head and the relationship is clearer as the age of the household head increases. Generally, among those older than 50, average household income decreases as the proportion of retired households increases, and the absolute income gap tends to narrow. However, in terms of the relative income gap, the difference between those still in the labor market and those who exited the market gets bigger, resulting in a widening gap. Therefore, the Gini coefficient of the society as a whole also increases with the aging of the population, unless the relative income gap by age group narrows by a significant amount.

Based on the idea that the changing households mix by age group, caused by the low fertility rate and population aging, is a factor driving the change in population structure, Sung and Park (2009) projected the impact of the change

in household proportions by age of household head on the inequality of household income until 2050 using the squared coefficient of variation (SCV). Yu Sam-hyun et al. (2017) estimated the change in the Gini coefficient until 2045 based on Statistics Korea's data using the research methodology of Sung and Park (2017). Both studies predicted that income inequality will increase as population aging proceeds.

Measures of Income Redistribution and Progression

A. Types of Income Redistribution

The OECD (2008) defines three types of redistribution: redistribution across income levels, redistribution of social risks, and redistribution across the lifecycle. Redistribution across income levels is redistribution among the different income earners at certain points in time, which Werding (2003) called “Robin Hood redistribution.” The redistribution of social risks is the pooling of various social risks, such as unemployment and disease, under social insurance as a means of addressing uncertainty. Redistribution across the lifecycle is the transfer of income from one's working period, when earnings are higher, to one's retirement, when earnings are lower, which is similar to Werding (2003)'s “piggybank objective.”

Future demographic changes, dominated by low fertility and population aging, will increase the need for redistribution across income levels and across the lifecycle. In the short term (in a cross-sectional sense), income redistribution across income levels may not be consistent with income redistribution across the lifecycle. Income redistribution across income levels emphasizes the vertical equity of short-term income. Although income redistribution across the lifecycle partly plays a role in the redistribution of income across income levels, it mainly functions to flatten income flows during the lifecycle. The function of redistribution across income levels under the national pension, which aims to transfer income from one point in time to another in people's lives, is not the temporary income standard but the lifetime income standard. There is a clear

gap between the two, as the yearly income and the lifetime income are not necessarily identical.

Among these various definitions of redistribution, the redistribution function targeted in this study is redistribution across income levels, as it is the most commonly used and easily calculated.

B. Measures of Progression

The progression index is often used as a measure of the degree of the redistribution. According to Paturot, Mellbye, and Brys (2013), the types of progression index are categorized as: average-rate progression, liability progression, and residual income progression.²⁾

The progression indices are defined as follows.

① Average-rate progression:

$$\frac{\frac{T_1}{Y_1} - \frac{T_0}{Y_0}}{Y_1 - Y_0} = \frac{\text{Increase/decrease in effective tax rate}}{\text{Income increase or decrease}} = \frac{\Delta \text{Effective tax rate}(T/Y)}{\Delta \text{Income}(Y)}$$

② Liability progression:

$$\frac{\frac{T_1 - T_0}{T_0}}{\frac{Y_1 - Y_0}{Y_0}} = \frac{\text{increase rate of tax burden}}{\text{Income growth rate}} = \frac{\frac{T_1 - T_0}{Y_1 - Y_0}}{\frac{T_0}{Y_0}} = \frac{\text{Marginal effective tax rate}}{\text{Average effective tax rate}}$$

③ Residual income progression:

$$\frac{(Y_1 - T_1) - (Y_0 - T_0)}{Y_0 - T_0} = \frac{\text{Increase in disposable income}}{\text{Disposable income}}$$

2) Residual income can also be interpreted as disposable income.

T_0, T_1 : Tax burden before and after the change

Y_0, Y_1 : Income before and after the change

However, this progression index is different from the overall redistribution effect of the system, because it is measured at a certain income level.

C. Relationship between Income Tax Progression and Redistribution Effect

Sung (2016b) confirmed the correlation between progression and the income redistribution effect by using the relationship between income deduction and progression of the income tax burden at a given tax rate. This result led to simulations that confirmed the existence of a correlation curve between the two variables similar to an inverted “U.” In addition, it was also confirmed that Korean income tax is in the area of negative correlation between progressivity and the redistribution effect. This shows that lowering income deductions under a given tax system reduces the progressivity but increases the total redistribution effect, due to the resulting increase in tax revenue. To increase the feasibility of the tax policy, the fixed deduction structure is temporarily suggested as a way of reinforcing the redistribution by increasing the natural income tax burden through wage increases.

5 Population Structure and Income Redistribution by Taxes

A. The Effect of Population Aging on Income and Spending

Income and consumer spending shows different patterns by age group. When the structure of households and population of a society change due to population aging, the income and consumption patterns of the society change as well. This also has an influence on the redistribution effect of the tax policy by changing the tax burden distribution.

To analyze the impact of population aging, we used the 2014 household

survey data to simulate the effects of such aging. Based on the 2014 tax-benefit model, we calculated the Gini coefficients for pre-tax and post-tax incomes by applying the distribution of benefits and burdens at a certain time and adjusting household weights by age, in line with the population aging trend. The period of time subject to analysis was 2000 to 2045, for which Statistics Korea provides the distribution of the households by age group. As the population ages, the Gini coefficients for all kinds of income are expected to increase as the sample weights of the aged group increase.

The Gini coefficient of private income, which is the sum of market income and private transfer income, are expected to rise by 21.6%, from 0.35739 in 2014 to 0.43449 in 2045. During the same period, the increase rates of the Gini coefficients for other types of income are: 17.9% for total income (0.33574 → 0.39580), 18.2% for disposable income (gross income - direct tax) (0.31959 → 0.37767), 17.1% for after-tax income (disposable income - consumption tax) (0.32029 → 0.37517), and 13.1% for final income (after-tax income + in-kind benefits) (0.30286 → 0.34241). Among them, the increase rate of the Gini coefficients for final income and after-tax income which reflect the effects of various consumption taxes and in-kind benefits, respectively, are lower than the increase rate of the Gini coefficient for the disposable income, which reflects the effect of direct tax. This shows that when the size of the elderly population, which has relatively low levels of consumption and income, increases, consumption tax may serve to mitigate the widening of the income gap.

〈Table III-3〉 Simulation Results of Gini Coefficient under Various Income Definitions

	Private income	Total income (GY)	GY-income tax (GY1)	GY1-property tax	Disposable income (DY)	DY-VAT	DY-VAT-in individual consumption and transport taxes	After-tax income	Final income
2000	0,32939	0,31258	0,30079	0,30097	0,29736	0,29852	0,29815	0,29887	0,28465
2001	0,33110	0,31389	0,30210	0,30228	0,29861	0,29974	0,29935	0,30007	0,28569
2002	0,33319	0,31558	0,30374	0,30393	0,30016	0,30125	0,30084	0,30156	0,28701
2003	0,33512	0,31711	0,30524	0,30544	0,30158	0,30262	0,30219	0,30291	0,28817
2004	0,33716	0,31875	0,30685	0,30706	0,30309	0,30409	0,30363	0,30435	0,28938
2005	0,33971	0,32087	0,30894	0,30916	0,30507	0,30602	0,30554	0,30626	0,29111
2006	0,34129	0,32214	0,31022	0,31045	0,30630	0,30723	0,30674	0,30745	0,29210
2007	0,34297	0,32356	0,31159	0,31183	0,30761	0,30851	0,30800	0,30872	0,29317
2008	0,34482	0,32512	0,31314	0,31338	0,30910	0,30996	0,30944	0,31016	0,29441
2009	0,34658	0,32659	0,31456	0,31482	0,31049	0,31133	0,31080	0,31152	0,29548
2010	0,34861	0,32834	0,31632	0,31657	0,31222	0,31302	0,31247	0,31319	0,29690
2011	0,35044	0,32981	0,31782	0,31810	0,31370	0,31446	0,31390	0,31462	0,29809
2012	0,35239	0,33153	0,31956	0,31983	0,31539	0,31612	0,31554	0,31625	0,29938
2013	0,35531	0,33401	0,32205	0,32234	0,31781	0,31848	0,31787	0,31858	0,30150
2014	0,35739	0,33574	0,32389	0,32419	0,31959	0,32022	0,31958	0,32029	0,30286
2015	0,36035	0,33818	0,32631	0,32660	0,32193	0,32248	0,32179	0,32250	0,30482
2016	0,36330	0,34055	0,32874	0,32904	0,32424	0,32471	0,32398	0,32468	0,30665
2017	0,36597	0,34277	0,33096	0,33127	0,32636	0,32677	0,32602	0,32672	0,30836
2018	0,36844	0,34474	0,33299	0,33330	0,32829	0,32862	0,32783	0,32853	0,30988
2019	0,37096	0,34669	0,33497	0,33530	0,33020	0,33049	0,32968	0,33037	0,31154
2020	0,37321	0,34835	0,33665	0,33697	0,33178	0,33203	0,33119	0,33188	0,31269
2021	0,37597	0,35044	0,33876	0,33910	0,33380	0,33398	0,33310	0,33378	0,31429
2022	0,37843	0,35224	0,34062	0,34097	0,33555	0,33566	0,33474	0,33541	0,31552
2023	0,38061	0,35374	0,34216	0,34250	0,33697	0,33703	0,33608	0,33673	0,31645
2024	0,38294	0,35536	0,34385	0,34422	0,33857	0,33855	0,33756	0,33822	0,31765
2025	0,38516	0,35702	0,34555	0,34591	0,34015	0,34010	0,33909	0,33974	0,31876
2026	0,38805	0,35928	0,34783	0,34820	0,34233	0,34223	0,34120	0,34184	0,32041
2027	0,39048	0,36110	0,34971	0,35010	0,34415	0,34400	0,34294	0,34357	0,32165
2028	0,39338	0,36345	0,35208	0,35247	0,34640	0,34617	0,34506	0,34568	0,32316
2029	0,39587	0,36520	0,35388	0,35428	0,34812	0,34782	0,34667	0,34729	0,32421

〈Table III-3〉 Continued

	Private income	Total income (GY)	GY-income tax (GY1)	GY1-property tax	Disposable income (DY)	DY-VAT	DY-VAT-in individual consumption and transport taxes	After-tax income	Final income
2030	0.39861	0.36750	0.35621	0.35661	0.35032	0.34995	0.34875	0.34936	0.32571
2031	0.40101	0.36928	0.35804	0.35845	0.35206	0.35162	0.35038	0.35097	0.32682
2032	0.40387	0.37154	0.36035	0.36077	0.35430	0.35378	0.35249	0.35308	0.32838
2033	0.40660	0.37365	0.36252	0.36294	0.35635	0.35578	0.35446	0.35503	0.32975
2034	0.40951	0.37592	0.36482	0.36525	0.35855	0.35792	0.35656	0.35712	0.33122
2035	0.41217	0.37799	0.36695	0.36738	0.36059	0.35990	0.35849	0.35904	0.33249
2036	0.41496	0.38032	0.36927	0.36970	0.36280	0.36204	0.36059	0.36113	0.33395
2037	0.41743	0.38216	0.37114	0.37157	0.36456	0.36376	0.36229	0.36281	0.33504
2038	0.41991	0.38421	0.37319	0.37363	0.36654	0.36569	0.36419	0.36471	0.33628
2039	0.42245	0.38632	0.37532	0.37575	0.36856	0.36766	0.36612	0.36663	0.33753
2040	0.42502	0.38834	0.37734	0.37779	0.37051	0.36955	0.36798	0.36847	0.33870
2041	0.42701	0.38995	0.37899	0.37943	0.37205	0.37102	0.36941	0.36989	0.33948
2042	0.42895	0.39137	0.38044	0.38088	0.37338	0.37228	0.37063	0.37111	0.34016
2043	0.43102	0.39301	0.38209	0.38253	0.37494	0.37379	0.37211	0.37258	0.34100
2044	0.43279	0.39444	0.38356	0.38401	0.37633	0.37514	0.37344	0.37390	0.34173
2045	0.43449	0.39580	0.38497	0.38542	0.37767	0.37644	0.37472	0.37517	0.34241

Note: 1. Author's estimates using simulation based on Statistics Korea's 2014 Household Trends Survey (However, for the Gini coefficient for gross income, the estimates of Yu Sam-hyun et al. (2017) were used.)

2. The estimation method of Yu Sam-hyun et al. (2017) (simulations in Chapter 5) was used. In this section, we expand the method to private income, disposable income, after-tax income, and final income.

* Research data and methodology: Based on the simulations in Chapter 5 of Yu Sam-hyun et al. (2017)

Method A: Simulation was conducted by adjusting the sample weights of the household survey data based on Statistics Korea's household prospects (2000–2045).

Method B: For the year 2014, an error occurred due to sampling differences in the household survey data and the estimated household statistics, for which an endpoint adjustment was applied.

3. Private income = market income + private transfer income; after-tax income = disposable income – consumption tax; final income = after-tax income + in-kind benefits (in-kind benefits refers to the amount of the basic livelihood security payment and education, childcare, and health insurance and housing benefits).

4. DY-VAT: disposable income – VAT

DY-VAT– Special consumption tax and transport tax: Disposable income – VAT – Special consumption tax and Transport tax (surtax)

B. Ageing and Income Redistribution Effect of Income Tax, Property Tax, and Consumption

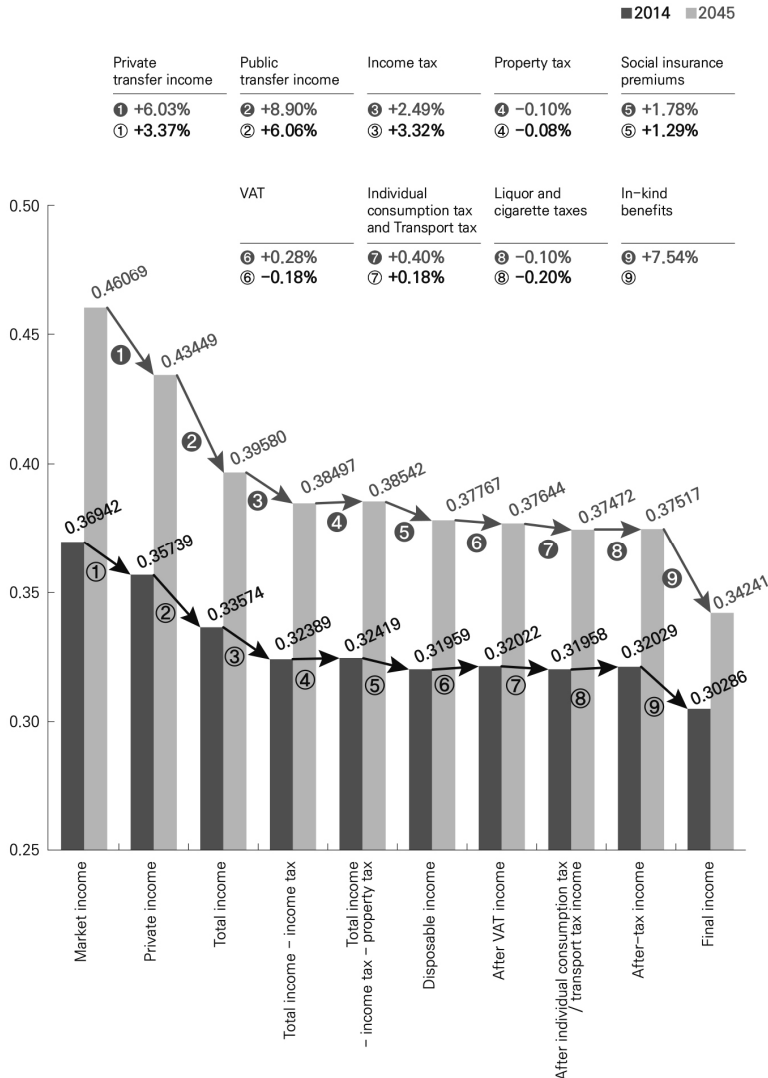
The total income redistribution effect of tax and expenditure, which is calculated based on the change of the Gini coefficients for private income and final income, is expected to increase from 15.26% in 2014 to 21.19% in 2045. Among the two, the income redistribution effect of taxes, such as the income tax, property tax, social security contributions, and consumption tax, is expected to increase from 4.32% to 4.75% over the same period, with expenditure predicted to rise from 10.93% to 16.44%.

Two facts should be noted here. The first is that the income redistribution effect is achieved mainly through spending rather than tax. Second, when the increase in the income redistribution effect between 2014 and 2045 is compared, the effect of tax is expected to increase only slightly, while that of expenditure is expected to increase substantially. The first fact reflects the characteristics of expenditure, easiness of targeting, as is commonly found in other developed countries.

The second fact requires further investigation of the factors involved. Since this analysis does not take into account the increase in income and change in labor participation behavior caused by economic growth, the number of persons subject to income tax is reduced due to population aging and the growing size of the retired. As a result, the redistribution effect of income tax is greatly reduced. Meanwhile, the redistribution effect of social security contributions increases, owing to the increase in the retired who do not pay social security contributions.

In the case of VAT, the effect of income redistribution was -0.18% in 2014, showing a negative income redistribution effect. In 2045, the effect is reversed, recording +0.28%, which indicates a positive income redistribution effect. The reason for this is that Korea's VAT allows a wide range of tax exemptions for daily necessities. In other words, as population aging progresses, the number of people with a relatively high dependence on tax-free consumption increases, which turns the regressivity of value-added tax into a progressive structure in the long term. As this reflects only the effects of population aging, the results may be different when the effect of future income growth is taken into account.

[Figure III-1] Comparison of the Income Redistribution Effects of Major Taxes and Expenditures Under Population Aging



Note: 1. The percentages in the square boxes represent the pre-tax and post-tax rates of decrease in the Gini coefficient for tax and fiscal expenditure policies for each item. The denominator is based on the private income Gini coefficient used in the aforementioned Gini coefficient calculation.

Meanwhile, in the case of the individual consumption tax and transportation-energy-environmental taxes, the positive income redistribution effect is expected to increase further (0.18% in 2014 \rightarrow 0.40% in 2045) as population aging progresses. In the case of the liquor and tobacco taxes, the negative income redistribution effect is expected to decrease (from -20.20% in 2014 to -0.10% in 2045). In the case of alcohol and tobacco, the income elasticity of demand is low, and the consumption dependence of the low-income group is higher than that of the high-income group. As time goes by, aging will reduce the number of low-income workers who consume alcohol and tobacco.

In the case of fiscal expenditure (especially welfare expenditure), it is estimated that as long as the current welfare system is maintained, the proportion of beneficiaries will increase as population aging progresses, which will, in turn, significantly increase the income redistribution effect. This needs to be considered in viewpoint of long-term fiscal stability.

Conclusions

Population aging generates various ripple effects. In terms of tax and fiscal policy, the first effect of population aging is expected to be increasing income inequality. More specifically, it will change the distribution structure of labor-related income by reducing the proportion of the economically active population. If the proportion of labor income declines, the redistribution effect of income tax is also weakened. In addition, by increasing the proportion of elderly people who are highly dependent on VAT-free consumption, the regressivity of the VAT can be eased. However, the effects of taxes are the result of demographic change only excluding the real income growth caused by economic growth.

In order to respond to the growing trend of income inequality caused by population aging, it may be necessary to expand the redistribution policy. As tools of redistribution policies, both tax policy and fiscal spending policy can be used. In overseas countries, fiscal spending plays a major role. Given this, it is important that fiscal policy plays a central role in income redistribution

policy, while tax policy seeks to achieve a good balance between funding functions and redistribution policy. Specifically, income tax needs to be reformed with a focus on increasing both tax revenue and the income redistribution effect by expanding tax base and increasing the share of tax revenue. In the case of VAT, the proportion of tax revenue in an aging society should be further expanded. Although VAT may generate regressivity, it can achieve a greater redistribution effect through revenue recycling since it shows relatively robust revenue for population aging. From the viewpoint of equity in life-cycle, VAT can be a useful policy tool. We can find it in the developed countries where longevity is increasing rapidly.

IV

Determinants of Income Redistribution Effects

1 Background

The government's income redistribution policy is based on tax and fiscal expenditure. However, the redistribution effect can vary depending on the degree of utilization of specific policy tools. The use of policy tools is determined by various factors, such as the distribution of market income before government intervention in each country, size of the government, and tradition of social security systems. In this study, we look at the cases of several countries to analyze the redistribution effects of different means of redistribution, the structure of each means, and the degree of utilization. Based on this, we intend to provide suggestions for the selection and design of effective income redistribution policy.

Specifically, we analyze the impact of tax and expenditure policies on income redistribution, as measured by the Gini coefficient,³⁾ in OECD countries. Our reason for using the Gini coefficient as an analysis indicator is that it is a representative indicator that shows the income distribution of a society as a whole. As a standardized indicator, it is also very useful for comparative analyses of OECD countries.

3) It is an indicator for measuring income inequality that has a value from 0 to 1. If all members of a society earn the same income, its value is 0, and if one member earns all the income (with all other members' income being 0), its value is 1.

2 Previous studies

Sung(2016a)⁴⁾ analyzed the correlation among progressivity, tax revenue, and the income redistribution effect of the income taxation through simulations and regression analysis. The results showed that there is an inverted U-shaped relationship between progressivity and the income redistribution effect, and that the redistribution effect is currently a positive relation with tax revenue and a negative relation with progressivity. Sung(2016b)⁵⁾ analyzed the factors influencing income redistribution, including tax and subsidies, based on household income and consumption data. In this study, He examined the effect of the consumption tax and income tax and also looked at the effect of public pension and in-kind benefits. The results show that the redistribution effect of public pension and in-kind benefits is significant and shows a clear increasing trend.

Kim and Ryu (2010)⁶⁾ analyzed the effects of corporate tax cuts and suggested their effect on income redistribution. They analyzed the effects by income quintile based on the assumption of the tax incidence on consumption, labor, dividend, and retained earnings.

However, these analyses are limited in that they are analyses of a specific tax, which make it difficult to compare among taxes. It is also difficult to take into account changes in tax revenue.

In this section, we quantitatively analyze the impact of the size, mix, and progressivity of tax and cash transfer policies, which have significant impacts on income redistribution. Based on this, we intend to identify policy tools that have major impacts on income redistribution and provide them as basic data for policy formulation.

4) Sung, Myung Jae, "Correlation Analysis of Progressivity of Income Tax Burden and Effect of Redistribution of Income," *Korean Journal of Public Finance*, Vol. 9, No. 2, 2016.

5) Sung, Myung Jae, "Distributional Characteristics of Taxes and Benefits and Redistributive Effects of Related Government Policies," *Journal of Korean Economic Analysis*, Vol. 22, No. 1, 2016, pp. 1-65.

6) Kim, Seung-Rae and Doeckhyun Ryu, "The Economic Effects of Deficit-financed Tax Cut in Korea," *Korea Institute of Public Finance*, Dec. 2010.

3 Correlation between Redistribution Effects and Various Policies in OECD Countries

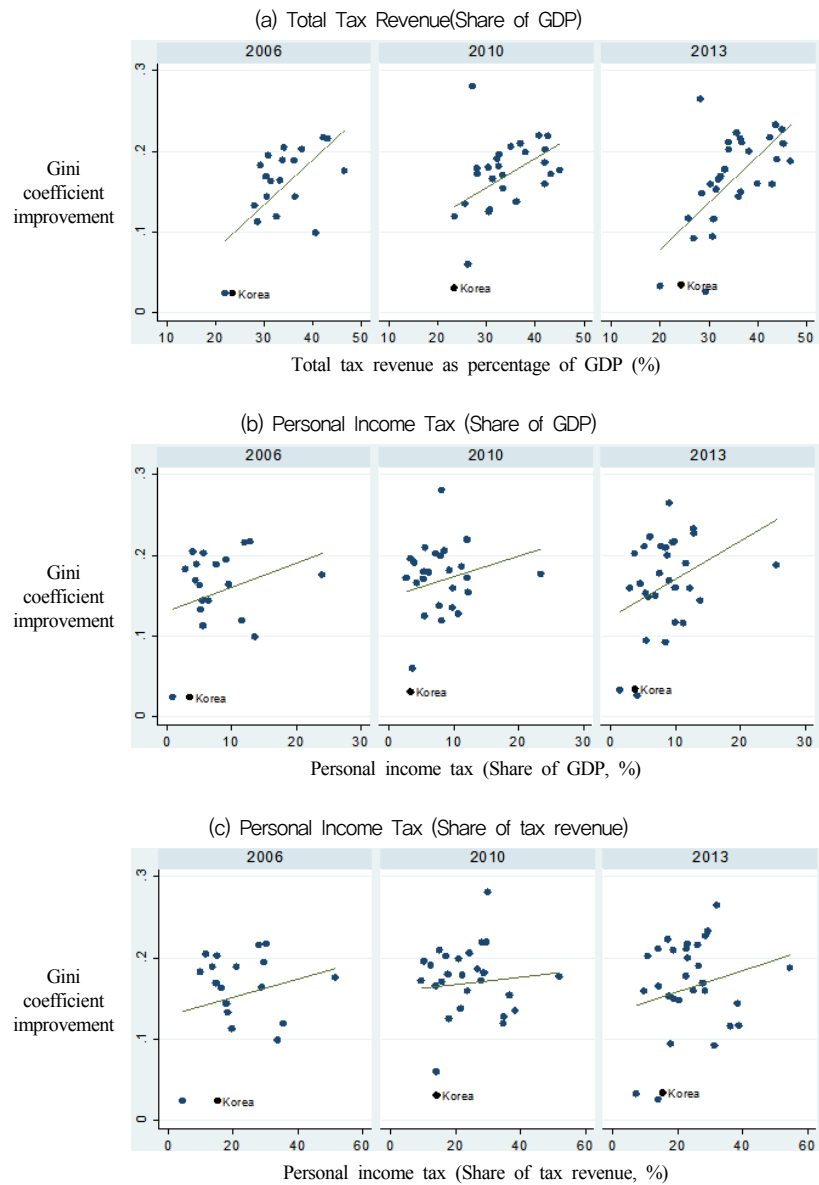
The data show that total tax revenue as a percentage of the GDP and cash-based social welfare expenditure have the most significant correlation with the income redistribution effect, as defined by the change of the Gini coefficient. In fact, the income redistribution effect depends on the level of tax burdens and government cash transfer.

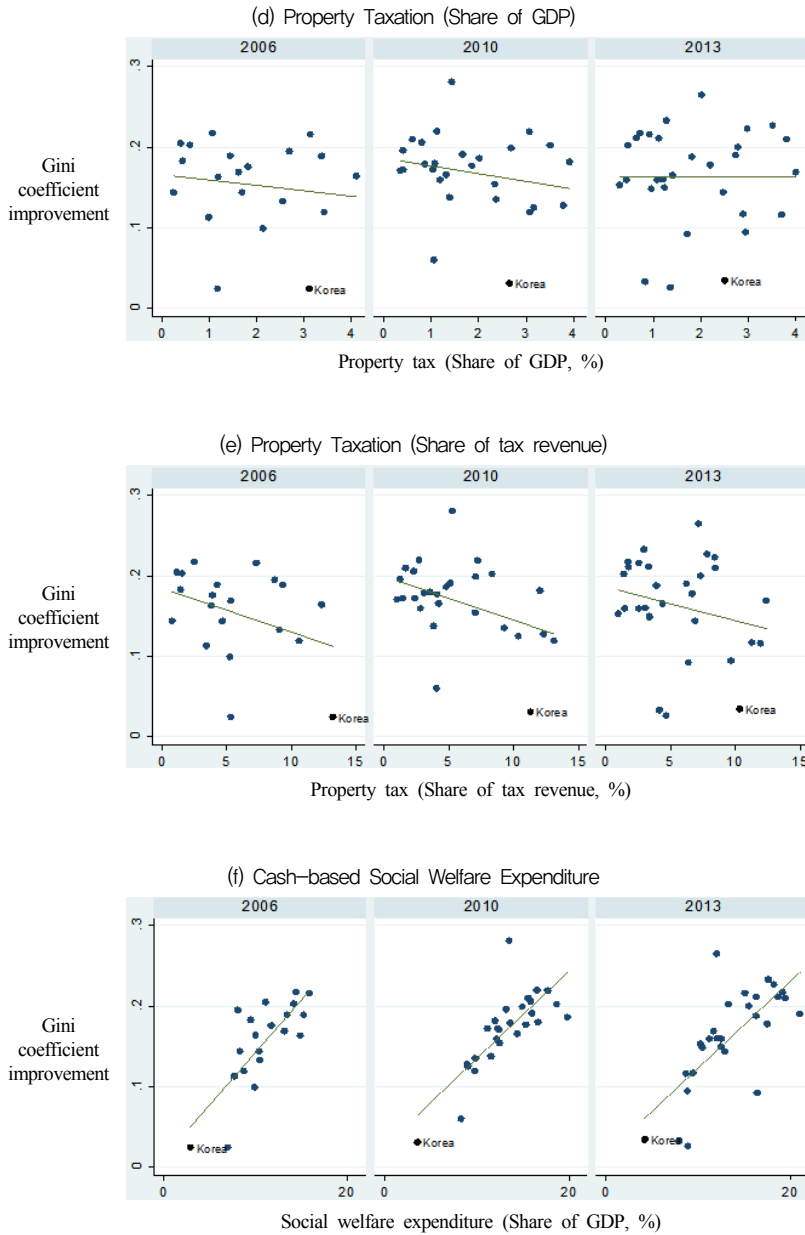
Among tax items that constitute total tax revenue, the personal income tax burden and income redistribution improvement show relatively weak correlations. Changes in correlation over time are not clear. In Korea, the Gini coefficient improvement and the revenue share of personal income tax are relatively low. However, if the convergence to international trends is assumed, an increase in personal income tax is expected to improve the redistribution index measured by the Gini coefficient. The revenue share of personal income tax also shows a proportional relationship with income redistribution improvement.

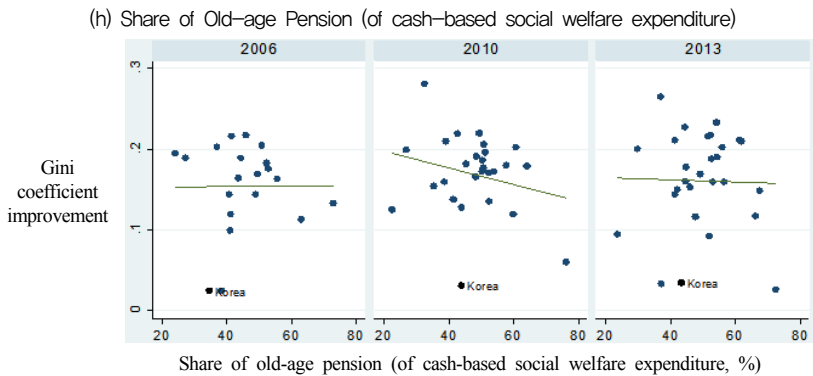
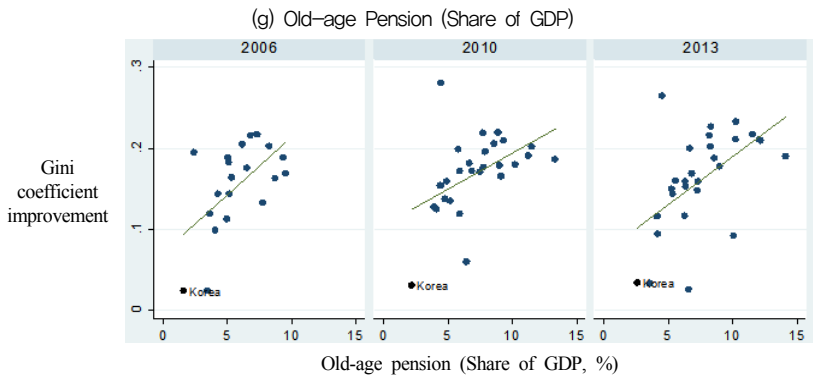
Property taxation, which is recognized as an important means of income redistribution, is likely to result in the taxation of high-income earners, which will affect redistribution. However, it is difficult to confirm the expected correlation between the actual property tax revenue (share of GDP) and Gini coefficient improvement.

The income redistribution effect also shows a significant proportional relationship with total cash social welfare expenditure. Although the extent of the relationship changes over time, the relatively clear relations do not change. Old-age pension expenditure, which is a typical redistribution measure, also shows a proportional relationship with Gini coefficient improvement. The higher old-age pension expenditure, we expect the lower income gap in society since it is paid to the retired.

[Figure IV-1] The relationship between policy tools and Gini coefficient improvement







Source: OECD database (OECD.stat)

4 Impacts of Tax and Expenditure Policies on Income Redistribution

To analyze the effects of tax and fiscal policy on income redistribution, we set up the following regression model, based on previous researches.

$$\Delta Gini_{i,t} = \alpha_i + \sum_{j=1}^n \beta_j x_{i,t}^j + \epsilon_{i,t}$$

The income redistribution effect, as defined here, is the difference between the Gini coefficient for market income and the Gini coefficient for income after taxes and subsidies. Here, x^i represents tax and fiscal spending policies that trigger changes in the Gini coefficient. i represents a given country, and t is a given year.

The explanatory variables were chosen to reflect the level of tax and spending policy, the mix of policies, and the progressivity of each policy, and the data used was taken from the OECD database. To reflect the progressivity of the tax policy, we used the top individual income tax rate and the progressivity of the income tax burden at certain income bracket (low- and high-income brackets). The progressivity at the low-income bracket was calculated based on 67% to 100% of average earnings, while that of the high-income bracket was calculated based on 100% to 167% of average earnings.

The analysis showed that for every increase of 1%p in total tax revenue as a percentage of the GDP, the Gini coefficient improvement increased by 0.001. Also, for every increase of 1%p in the revenue share of personal income tax, the Gini coefficient improvement increased by 0.0014, slightly more than for the same increase in total tax revenue. The top income tax rate, which represents progressivity, has increased the redistribution effect by 0.0006 for every 1%p increase, but the increase of the top income tax rate is less effective for the redistribution than increasing the revenue share of personal income tax or total tax revenue. The effect of progressivity at certain income bracket shows that the progressivity at the low-income bracket has a significant effect on redistribution improvement. This is because the high progressivity at the low-income bracket (from 67% to 100% of average earnings) changes tax burden of all workers who earn more than 67% of average earnings so that we can

enjoy much higher revenue. On the contrary, the progressivity at the high-income bracket (from 100% to 167% of average earnings) was not very significant. An increase in the revenue share of property taxation does not have a significant effect on overall income redistribution improvement. This is owing to the inconsistency between property holding and income level and existence of transaction tax and its revenue difference.

〈Table IV-1〉 Definition of Variables

Name of Variable	Remark
Gini coefficient improvement	Wage income Gini coefficient before tax/subsidy – wage income Gini coefficient after tax/subsidy
Total tax revenue as percentage of GDP	Percentage of total taxes(including social security contributions) to GDP = (tax + social security contributions) / GDP
Revenue share of personal income tax	Share of personal income tax revenue = personal income tax revenue / total tax revenue
Revenue share of property tax	Share of property tax revenue = Property tax revenue / total tax revenue
Top tax rate	Top statutory tax rate for personal income (national + provincial)
Progressivity of income tax	
67%~100%	(Income tax rate at 67% of average wage – income tax rate at 100% of average wage) / (67% of average wage – 100% of average wage)
100%~167%	(Income tax rate at 100% of average wage – income tax rate at 167% of average wage) / (100% of average wage – 167% of average income)
Social welfare expenditure	GDP share of cash-based social welfare expenditure = Cash-based social welfare expenditure / GDP
Share of old-age pension	Share of old-age pension expenditure to cash-based social welfare expenditure = Old-age pension / Cash-based social welfare expenditure
Share of unemployment benefits	Share of unemployment benefits to cash-based social welfare expenditure = Unemployment benefits / Cash-based social welfare expenditure
Share of self-employed workers	Share self-employed workers ⁷⁾ to total workers (%) = Number of self-employed workers / Number of total workers

7) Self-employed workers refers to people who work for themselves, members of producer cooperatives, or unpaid family workers (OECD,stat Labour Force Statistics).

Cash-based social welfare expenditure has a significant income redistribution effect, recording about 0.0049 for every 1%p (as percentage of GDP), which is five times higher than the effect of total tax revenue. This is because the target of social welfare expenditure is narrower than the tax system, focusing on low-income earners, including the unemployed, and retirees. It is believed that as the proportion of the old-age pension and unemployment benefits increases, the improvement in income redistribution will increase as well. The magnitude of this improvement effect is estimated to be from 0.0004 to 0.0005.

The share of one-person companies introduced to reflect the income redistribution environment across the country is a factor that serves to lower the redistribution improvement effect. A 1%p increase in the share of self-employed workers is estimated to reduce the income redistribution effect by 0.002. This impact is larger than the effects of all revenue-related factors, such as total tax revenue as a percentage of the GDP and an increase in the proportion of the individual income tax. This shows that policy that aims to increase transparency is important not only in terms of revenue transparency but also in relation to transparency in specifying targets for annual expenditure policy.

〈Table IV-2〉 Analysis of Factors Determining Redistribution Effect (based on 2000-2012 and 2011 definitions)

△ Gini coefficient	OLS		Fixed effect	
	Coef.	P-value	Coef.	P-value
Total tax revenue as percentage of GDP (%)	0.0019***	0.000	0.0010**	0.026
Percentage of individual income tax	-0.0001	0.614	0.0014***	0.001
Percentage of property tax	-0.0023***	0.000	0.0014	0.146
Highest tax rate (Individual, %)	-0.0009***	0.001	0.0006***	0.005
Income tax progressivity				
67~100%	0.0011***	0.006	0.0008***	0.005
100~167%	0.0023***	0.000	0.0001	0.920
Social welfare expenditure (%)	0.0046***	0.000	0.0049***	0.000
Percentage of old-age pension	-0.0001	0.490	0.0005**	0.020
Percentage of unemployment benefits	0.0002	0.197	0.0004*	0.063
Percentage of self-employed workers	-0.0013***	0.000	-0.0020***	0.001
Gini coefficient(market income)	0.3720***	0.000	0.4590***	0.000
Year	-0.0004	0.461		
Constant	0.6561		-0.2181***	
Observations	242		242	
R-square	0.7529		0.4231	

Note 1. △ Gini coefficient = Gini (market income) – Gini (post-tax and transfer) (based on 2011 definition)

2. 67~100% income progressivity = ((earned income tax rate of workers whose wages are 67% of the average wage – earned income tax rate of workers whose wages are 100% of the average wage) / (67–100)) * 100

3. 100~167% income progressivity = ((earned income tax rate of workers whose wages are 100% of the average wage – earned income tax rate of workers whose wages are 167% of the average wage) / (100–167)) * 100

4. Fiscal expenditure, including social welfare expenditure, refers to cash-based expenditure, and its magnitude is the sum of public and mandatory private expenditure in the OECD SOCX statistics.

5. Hausman test results support the fixed-effect model.

Source: OECD.stat

These results show little change, even if data based on modified disposable income definitions (2012 standards) are used. Overall, the statistical impact of tax has declined, while the impact of expenditure has increased.

5 Conclusion

We analyze the effects of tax and expenditure policy tools on income redistribution effect defined by Gini coefficient improvement. Since the tax burden of Korea is relatively low compared to other OECD countries, and is expected to increase in the future, we examined the OECD countries that increased their tax burdens and implemented various policies before Korea.

Panel analysis showed that expenditure, rather than tax, had a significant impact on income redistribution. This is because expenditure (public welfare expenditure) policy linked to income level directly changes income, as compared to the tax system, which has various taxation criteria (income, consumption, asset transaction, etc.). As for personal income tax, the top tax rate had a positive effect on income redistribution. And the tax burden progressivity for the low-income bracket had a statistically significant effect. As for expenditure, unemployment benefits and social welfare (cash) expenditure had a positive effect. But the old-age pension, which mainly serves to flatten the income across individuals' lifecycle, was not statistically significant in terms of income redistribution improvement in the current year.

Meanwhile, the proportion of self-employed workers is a factor that reduces the income redistribution effect, indicating that low income transparency lowers overall redistribution effect of a country. In addition, the more unequal market income (or income redistribution conditions) is, the greater the income redistribution effect that can be achieved through the same system.

These results show that the effective design of expenditure (social welfare expenditure) is important for future income redistribution. This suggests that redistribution policies need to be implemented from an integrated point of view considering not only the tax system but also the impact of fiscal spending policy. From the perspective of revenue, total tax revenue as a percentage of the GDP was found to be the most effective redistribution measure, while, among the various tax items, the proportion of personal income tax, top tax rate, and the progressivity around average income also play important roles.

V

Harmonization of Financing and Redistribution in Personal Income Tax

1 Background

Personal income tax, which is a means of public funding, plays an important role in income redistribution. In particular, in the 2010s, when Korea's high-growth period ended and its overall growth rate had declined, the role of personal income tax became increasingly important as a means of facilitating both funding and redistribution. This is because redistribution occurs in the stage of securing tax revenue, as personal income tax has a progressive rate structure, and the redistribution function can be obtained during the expenditure process. However, strengthening the function of personal income tax inevitably affects people's working incentives. It is thus desirable to reduce this negative impact as much as possible when securing tax revenue and means of income redistribution. In this chapter, we evaluate the marginal tax rate structure of personal income tax, the income tax rates applied to whom move from unemployed to employed, and the relationship between tax revenue and the redistribution function.

2 Marginal Tax Rate Structure

In analyzing redistribution through personal income tax, the marginal tax

rate structure is an important factor that influences incentives for workers. The marginal tax rate structure can be analyzed based on two factors: the intensive margin and the extensive margin of the labor supply. The adjustment of working hours due to the income tax burden of workers is an intensive margin of the labor supply, while changes in the labor market participation decision are an extensive margin of the labor supply.

A. Participation Tax Rate (PTR)

To analyze the effect on labor supply in extensive margins, the labor market participation tax rate (PTR) should be examined. The PTR is an index for assessing the degree to which welfare beneficiaries' labor market participation is hampered by tax and welfare benefits, such as unemployment benefits. The index assesses the extent to which distortions of people's incentive to participate in the labor market by comparing the tax burden of welfare benefits for the unemployed with that of the income tax imposed when employed. It is an important factor that determines the extensive margin of the labor supply.

According to the analysis, the labor market participation tax rates ranges from 2.7% to 7.4% for single-person households and from 0.0% to 4.8% for four-person households. For single-person households, the marginal tax rate levied on an unemployment benefit recipient upon returning to work at an income level 50% that of their previous job (that is, income equal to unemployment benefit) is 2.69%. In the case of a worker returning to work at the same income level as their previous job, the PTR for a single-person household is 3.84%. This goes as high as 7.43% for a worker returning to work at an income level 150% that of their previous job. It seems that the distortion caused by the income tax is small on the labor market participation of unemployment benefit recipients. This is because the marginal tax rate faced by normal income earners is 8.9%⁸⁾ after the earned income deduction and the earned income tax credit. Depending on income level, the PTR of a household head of a four-person household ranges

8) When the total salary is KRW 45 million, $15\% \times (1 - \text{Wage Income Deduction Rate (15\%)}) \times (1 - \text{Wage Income Tax Deduction Rate (30\%)}) = 8.9\%$

from 0.0% to 4.81%, which is lower than that of a household head of a single-person household due to the deductions available to multi-person households. These results suggest that the degree of distortion of labor market participation incentives caused by social security benefits, such as unemployment benefits, is not large.

〈Table V-1〉 Labor Market Participation Tax Rate by Household Type

Type of household	Scenario	Average tax rate	PTR
Single-person household	Earned income is 50% of earned income before unemployment (Unemployment benefit: KRW 10,419,840 → Earned income: KRW 15,846,840)	0.92%	2.69%
	Earned income is 100% of earned income before unemployment (Unemployment benefit: KRW 10,419,840 → Earned income: KRW 31,693,680)	2.58%	3.84%
	Earned income is 150% of earned income before unemployment (Unemployment benefit: KRW 10,419,840 → Earned income: KRW 47,540,520)	5.80%	7.43%
Four-person household	Earned income is 50% of earned income before unemployment (Unemployment benefit: KRW 10,419,840 → Earned income: KRW 15,846,840)	0.00%	0.00%
	Earned income is 100% of earned income before unemployment (Unemployment benefit: KRW 10,419,840 → Earned income: KRW 31,693,680)	0.30%	0.45%
	Earned income is 150% of earned income before unemployment (Unemployment benefit: KRW 10,419,840 → Earned income: KRW 47,540,520)	3.75%	4.81%

Note: The unemployment benefit is calculated by multiplying the maximum amount of the unemployment benefit as of 2016 (KRW 43,416) by the maximum payment period (240 days).

B. Marginal Tax Rate by Income Level

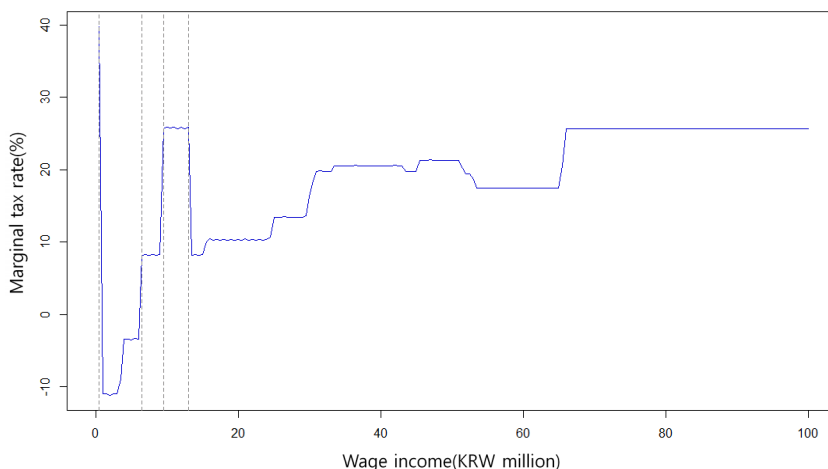
Next, we analyze the marginal tax rate by income level of those participating in the labor market and benefiting from the social security system. The purpose of this is to analyze the intensive margins of the welfare beneficiaries. The welfare systems that grant benefits to those who are working include the Earned Income Tax Credit (EITC) and National Basic Livelihood Security (NBLs).

1) Single-Person Households

In the case of a single-person household receiving the EITC, the marginal tax rate structure shows a gradual upward trend. However, at the maximum EITC amount (when the amount begins to decrease as income increases, i.e., at an income of KRW 9 million), the marginal tax rate jumps to the mid-20% range, similar to the marginal tax rate applied to around KRW 70 million income earners. Considering the nominal tax rate of income tax (6% to 40%), the marginal tax rate is not very high.

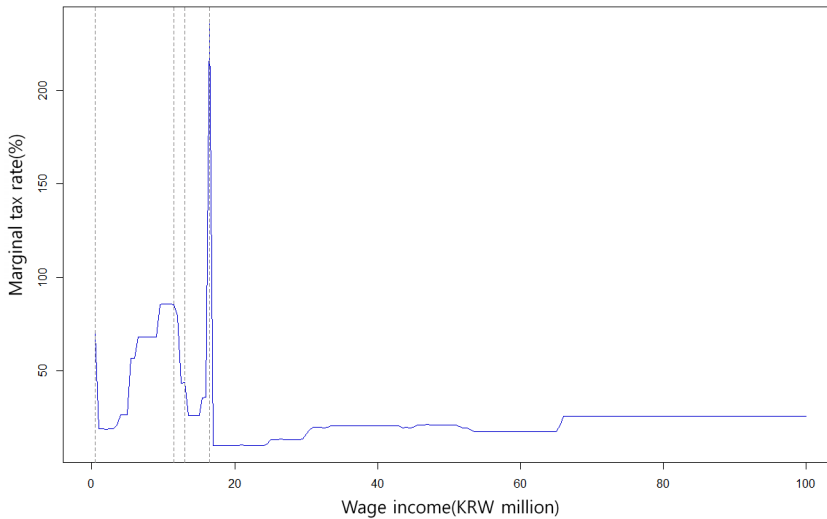
For a single-person household receiving both the EITC and NBLs, the marginal tax rate is high, due to the phase-out of the living and housing allowances. The marginal tax rate increases considerably as the household approaches the point at which the living allowance is terminated, showing that the decrease in the benefit due to the increase in income may undermine the incentive to work.

[Figure V-1] Marginal Tax Rate by income (single-person household receiving EITC)



Note: The reference lines (dotted lines) represent start of earning, beginning of maximum EITC amount, end of maximum EITC amount, and termination of EITC benefit.

[Figure V-2] Marginal Tax Rate by income (single-person household receiving both NBLS and EITC)



Note: The reference lines (dotted lines) represent start of earning, end of living allowance, end of EITC benefit, and termination of housing allowance (from left to right, respectively).

In addition, upon the termination of the housing allowance, the marginal tax rate surges temporarily, as a result of a slight reduction in income. This could lead to a “bunching” effect, meaning that the incomes of most recipients are located just below the income where the allowance terminates. It is desirable to eliminate such incentives, but the actual income level is not high, just below KRW 20 million, so that the bunching effect may not serious.

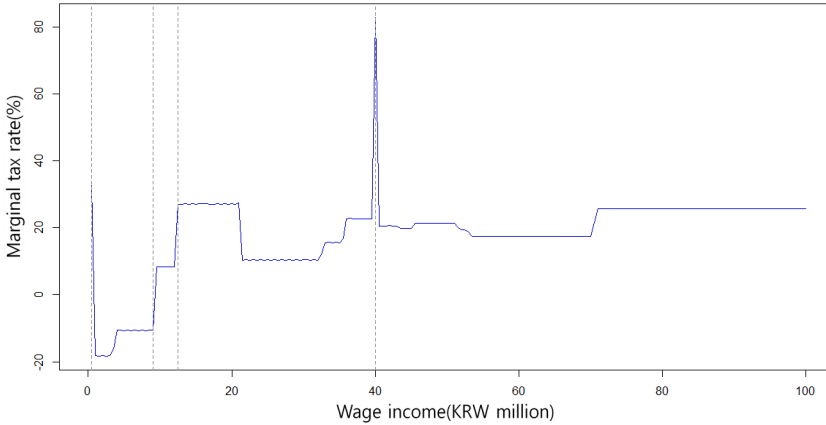
2) Head of Four-person Households

For a head of four-person household receiving the EITC and CTC (Child Tax Credit), the marginal tax rate increases gradually as income increases. This marginal tax rate is lower than that of single-person households due to personal allowances. Overall, it does not exceed 20% up to KRW 100 million. The section of the graph in which the marginal tax rate jumps is where the start and end

of maximum EITC credit, and the CTC is terminated. During the period where the EITC decreases gradually (from income of KRW 12 to 21 million), EITC credit (KRW 1.7 million) will be decreasing as income increases at a rate of 18.9% ($170/900$). Accordingly, a marginal tax rate over 20% is applied to a those income interval. However, the actual level is not very high. When the CTC is terminated, marginal tax rate shows a peak point but the span is quite narrow. Therefore, there would be no significant impact on people's incentive to work. In particular, when the point of CTC termination, it is unlikely that the incentive to work will be hampered, considering the difficulty in arbitrarily adjusting the number of children.

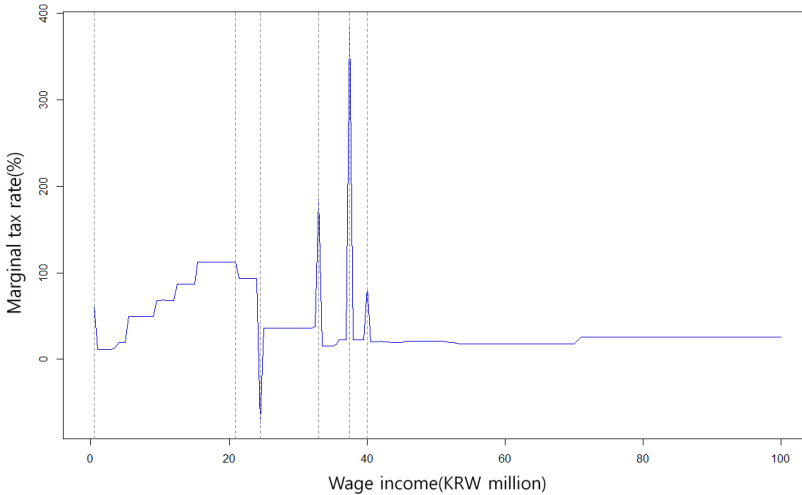
When receiving the NBLs along with the EITC and CTC, the marginal tax rate increases with income in the low income span, reaching 100% at the time of EITC phase-out. This is because NBLs, the supplementary benefit system that compensates for the difference between real income and target income, is also applied during the EITC phase-out span. In addition, at the points of termination of the housing, education, and CTC, the marginal tax rate temporarily increases. In general, the marginal tax rate increases due to the NBLs system (living, housing, and education allowances) are much higher than the marginal tax increase caused by tax-based benefits, such as the EITC and CTC. At the time of termination of the housing and education allowances, the post-tax and subsidy income decreases, resulting in a fairly high marginal tax rate. Since such a high marginal tax rate would seriously hamper the exit from the NBLs system, more efforts are needed to make improvements in this regard.

[Figure V-3] Marginal Tax Rate by income (Head of four-person household receiving both EITC and CTC)



Note: The reference lines (dotted lines) represent start of earning, beginning of maximum EITC credit, end of maximum EITC credit, and termination of CTC (from left to right, respectively).

[Figure V-4] Marginal Tax Rate by income (Head of four-person household receiving NBLs, EITC, and CTC)



Note: The reference lines (dotted lines) represent start of earning, termination of EITC benefit, termination of living allowance/beginning of receipt of CTC, termination of housing allowance, education allowance, and CTC (from left to right, respectively).

3 Correlation between Revenue and Redistribution effects of Income Tax

Here, we analyze the correlation between tax revenue and the distribution effect of personal income tax and several scenarios of institutional change. Since the income tax system plays a critical role in securing government revenues and redistribution policy, we seek to facilitate the policy decision process by analyzing the correlation between the two policy objectives of the income tax system. This analysis is based on the income tax system applied to 2016.

The correlation analysis of revenue and redistribution consists of several scenarios which include the already announced government's plan, the expansion of personal allowances that has been discussed in previous studies, and the reduction of wage income deductions. The first scenario (S1) applies the planned 2018 income tax structure, with marginal tax rates of 40% and 42% applied to the tax bases of KRW 300 to 500 million and over KRW 500 million, respectively. Based on S1, the second scenario (S2) also incorporates a scenario to abolish the 2% wage income deduction span, which is applied to the wage exceeding KRW 100 million. This is because that the gap between business income and wage income transparency is gradually diminishing and the cases of France and Japan also operated a similar scheme under the credit ceilings. Also based on S1, the third scenario (S3) incorporates a scenario to increase the personal allowances from KRW 1.5 million to KRW 2 million per dependent. This scenario reflects the fact that the current income tax system is based on individual tax unit system so that family size is not being fully taken into account. Based on both S2 and S3, the fourth scenario (S4) is the combination of S2 and S3 where applies higher tax rates, put a limits on wage income deduction, and increases personal allowances.

〈Table V-2〉 Scenarios for Analysis

	Tax rate changes		Abolishment of 2% wage income deduction span	Expansion of personal allowances
	Over KRW 300 million: 40%	Over KRW 500 million: 42%		
Scenario 1	○	○	–	–
Scenario 2	○	○	○	–
Scenario 3	○	○	–	○
Scenario 4	○	○	○	○

To examine the redistribution effect of each scenario, the Gini coefficient, deciles distribution ratio (income share of bottom 40% households/income share of top 20% households), and quintile multiple (average income of top 20%/average income of bottom 20%) are used.

To analyze the redistribution effect among households, we used the 9th wave of National Survey of Tax and Benefit (NaSTAB) data. These data consists of 4,832 households and 7,809 individuals.

〈Table V-3〉 Descriptive Statistics

(Unit: KRW 10,000)

Level	Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Individual	wage income	7,809	1,872	2,663	0	61,047
	business income	7,809	588	1,809	0	28,559
	Real estate rental income	7,809	78	576	0	20,000
	Interest and dividend income	7,809	8	111	0	6,395
	social insurance received	7,809	106	555	0	22,448
	private insurance received	7,809	37	502	0	20,000
	Public cash subsidy	7,809	52	171	0	7,200
Household	National basic livelihood security (NBLS) benefits	4,832	16	93	0	1,200
	Child caring subsidy	4,832	40	126	0	1,060
	Other in-kind benefit	4,832	0	13	0	864
	Earned income tax credit	4,832	2	19	0	720

First, the redistribution effect of the current system per KRW 1 trillion (tax or expenditure), the expenditure policy is more effective than the income tax system according to every indicator, including the Gini coefficient, quintile multiple, and deciles distribution ratio. The effect based on Gini index per KRW 1 trillion is -0.0005 for income tax, which is lower than that of subsidy, which recorded -0.0007. This shows that public transfer, targets mainly low-income households, is more effective than income tax in improving the Gini coefficient, which measures income inequality society-wide. Expenditure policies are more effective than income tax in improving other redistribution indicators, focusing on the gap between the upper and lower ranks as well.

〈Table V-4〉 Distribution Indicators Under Current System

	Pre-tax income	After-tax income 1 = pre-tax income - income tax		After-tax income 2 = pre-tax income - income tax + public transfer	
		Indicator	Δ Indicator / revenue (trillion KRW) ³⁾	Indicator	Δ Indicator / expenditure (trillion KRW) ⁴⁾
Gini coefficient	0.4239	0.4083	-0.0005	0.3897	-0.0007
Quintile multiple ¹⁾	12,1201	11,2335	-0.0294	8,6846	-0.0917
Deciles distribution ratio ²⁾	0.2961	0.3170	0.0007	0.3688	0.0019

Note: The Gini coefficient, quintile multiple, and deciles distribution ratio were calculated by applying household cross-sectional weights.

Public transfer income refers to the NBLs benefit, child tax credit, earned income tax credit, other in-kind support per household, and social security insurance and government-funded cash income per household member.

1) Quintile multiple = average income of top 20% households / average income of bottom 20% households.

2) Deciles distribution ratio = income share of bottom 40% households / income share of top 20% households

3) ΔIndicator / revenue (trillion KRW) = (indicator value of after-tax income 1 - indicator value of pre-tax income) / income tax revenue (trillion KRW)

4) ΔIndicator / expenditure (trillion KRW) = (indicator value of after-tax income 2 - indicator value of after-tax income 1) / public transfer (trillion KRW)

First, there are few samples in the NaSTAB data to analyze top tax rate increase for over KRW 300 million in the scenario S1, so the change of the Gini coefficient appears very small. However, the redistribution effect considering revenue is greater than that of the existing income tax due to the increased

tax burden on the high-income earners. The Gini change per KRW 1 trillion of tax revenue is -0.0009, which is nearly twice that of the existing income tax and greater than that of expenditure (-0.0007). This is because its policy target is more targeted than fiscal expenditure. However, the change in the quintile multiple representing the income gap is -0.0339 per KRW 1 trillion of tax revenue, which is much higher than that of the existing income tax (-0.0294) but less than half that of the existing expenditure (-0.0917). The deciles distribution ratio, too, is less effective than fiscal spending in alleviating the income gap.

The increase in the tax burden in S2 applies to all wage earners whose income is more than KRW 100 million, which leads to a greater improvement in the redistribution than in S1. The Gini coefficient in S2 is 0.4069, which is lower than the 0.4082 in S1, and the quintile multiple and deciles distribution ratio both show improved redistribution results as well. The redistribution effect per KRW 1 trillion of revenue is -0.0008 for the Gini coefficient, which is still greater than the average improvement made by the existing expenditure (-0.0007). However, this is slightly lower than that of S1 (-0.0009), which assumes an increase in the top tax rate only. The quintile multiple and deciles distribution ratio, which directly measure the reduction of the income gap, show greater effects than in S1, but they do not reach the average effectiveness of expenditure.

S3, which examines the increase in the top tax rate and additional increase in the personal allowance (KRW 1.5 million → KRW 2 million), affects all earners. Under S3 scenario, tax revenue is reduced. The Gini coefficient improved from 0.4239 (pre-tax) to 0.4088 (after-tax), which is lower than the values of 0.4082 and 0.4069 recorded in S1 and S2. Taking into account the tax revenue effect, the improvement per KRW 1 trillion of tax revenue is -0.0002, which is significantly lower than in S1 and S2 (-0.0009 and -0.0008). This is because the distribution of dependents is not consistent with the income level, showing that reforming the deduction system to reflect the level of expenditure by household size has no significant effect on income redistribution. For similar reasons, the improvements of the quintile multiple and deciles distribution ratio per KRW 1 trillion of tax revenue are also lower than those in S1 and S2.

S4, which applies the increase of the top tax rate, increase in the personal allowance and reduction in wage income deduction to income over KRW 100

million, results in a decrease in tax revenue but a significant improvement in the redistribution effect. Even though the increased personal allowance weakens the existing progressiveness, the effectiveness per KRW 1 trillion of tax revenue improves due to the reduction in wage income deduction for income over KRW 100 million. In the case of existing schemes, the improvements in the Gini coefficient, quintile multiple, and deciles distribution ratio are -0.0005, -0.0294, and 0.0007 per KRW 1 trillion of revenue, respectively, while the improvements in S4, which includes the increase in the maximum tax rate, reduction in the earned income deduction, and increase in the personal allowance, are much higher, at 0.0028⁹⁾, 0.0592, and -0.0036, respectively. As the redistribution index improves with the decline in revenue (compared to existing schemes), the sign of the indicators in S4 is different from those of the other scenarios. In conclusion, despite the improvement of redistribution indicators that is effectiveness, S4 does not contribute to secure revenue which can be recycled to improve income distribution through expenditure programs.

◀Table V-5▶ Distribution Indicators for the Four Scenarios

	Pre-tax income	Tax revenue	Post-tax income 1 = Pre-tax income - income tax		Post-tax income 2 = pre-tax income - income tax + public transfer
			Indicator	Δ Indicator/ Δ Revenue (trillion KRW) ³⁾	Indicator
Scenario 1		100.23			
Gini coefficient	0.4239		0.4082	-0.0009	0.3897
Quintile multiple ¹⁾	12.1201		11.2311	-0.0337	8.6828
Deciles distribution ratio ²⁾	0.2961		0.3171	0.0010	0.3689
Scenario 2		105.98			
Gini coefficient	0.4239		0.4069	-0.0008	0.3883
Quintile multiple ¹⁾	12.1201		11.1686	-0.0360	8.6343
Deciles distribution ratio ²⁾	0.2961		0.3189	0.0010	0.3709

9) Positive number means redistribution effect is improved with revenue decrease

〈Table V-5〉 Continued

	Pre-tax income	Tax revenue	Post-tax income 1 = Pre-tax income – income tax		Post-tax income 2 = pre-tax income – income tax + public transfer
			Indicator	Δ Indicator/ Δ Revenue (trillion KRW) ³⁾	Indicator
Scenario 3		93.35			
Gini coefficient	0.4239		0.4088	–0.0002	0.3902
Quintile multiple ¹⁾	12.1201		11.2783	–0.0223	8.7110
Deciles distribution ratio ²⁾	0.2961		0.3163	0.0003	0.3679
Scenario 4		99.01			
Gini coefficient	0.4239		0.4074	0.0028	0.3889
Quintile multiple ¹⁾	12.1201		11.2158	0.0592	8.6634
Deciles distribution ratio ²⁾	0.2961		0.3181	–0.0036	0.3700

Note: The level of tax revenue was calculated based on the assumption that the revenue under the current system is considered to be 100.

The Gini coefficient, quintile multiple, deciles distribution ratio were calculated by applying household cross-sectional weights.

Public transfer income refers to the NBLs benefit, child tax credit, earned income tax credit, other in-kind support per household, and social security insurance and government-funded cash income per household member.

1) Quintile multiple = average income of top 20% households / average income of bottom 20% households.

2) Deciles distribution ratio = income share of bottom 40% households / income share of top 20% households

3) Δ Indicator / Δ Tax revenue (trillion KRW) = (indicator value for S1 – indicator value for existing system) / (income tax revenue for S1 – existing income tax revenue)

4 Conclusion

Our analysis of the marginal tax rate of personal income tax revealed that the marginal tax rate structure by household size showed a general increase with income. The maximum marginal tax rate is less than 40% for those not receiving the NBLs benefit, regardless of the size of the household. On the other hand, the marginal tax rate for NBLs benefit recipients increases to almost

100% as incomes rises. However, after the graduation of the NBS, the rate falls under the top income tax rate. This suggests that there is no major problem with the current marginal tax rate structure of personal income tax at the absolute level and structure by income.

The labor market participation rate (PTR), which is used to measure the incentive for unemployed workers to enter the labor market, is also at or below 7%, despite various income change assumptions. This is due to the relatively low level of unemployment benefits and low income tax burden up to the low- and middle-income levels. This also implies that increasing the income tax burden to secure revenue and improve income redistribution would not have a significant impact on the labor market participation incentive.

According to the analysis of the correlation between the tax revenue and redistribution effect of income tax, the redistribution effect of income tax is lower than that of expenditure. Among the various ways of reforming the income tax system, the scenario of abolishing the wage income deduction for income exceeding KRW 100 million increases revenue by 5%, which is the highest contribution, while the contribution made by increasing the top tax rate is lower (0.2% to 0.5%). Increasing the personal allowance reduces tax revenue by 7%.

The income redistribution effect per KRW 1 trillion of tax revenue measured by the Gini coefficient shows that increasing the tax rate can be more effective than average spending policy when focusing on the high-income earners. However, according to the redistribution indicators such as the quintile multiple and deciles distribution ratio, in case of focusing on income disparities, the tax rate change would be less effective than expenditure. Increasing the personal allowance, the purpose of which is to reflect the size of households in tax burden, does not contribute much to the redistribution, but it does cause a significant decrease in tax revenue. This is because the correlation between the number of dependents and income is relatively low. As a result, in terms of securing tax revenue and improving income redistribution, it seems that adjusting wage income deduction rate is more effective than increasing the top tax rate.

VI

Harmonization of Financing and Redistribution in Property Taxes

1 Background

Property taxation has been recognized as an important policy tool for improving income redistribution. The reason for this is that increasing the property tax is considered a more effective means of enhancing equity than increasing tax on labor income, as financial and real estate assets are more unequally distributed than income. As a result, the comprehensive taxation of financial income has been introduced and strengthened, and the capital gains tax on real estate and holding tax is being increased. The top rate for the inheritance and gift tax is 50%. Moreover, regarding the transfer of assets related to the management rights of large corporations, the tax burden is heavier due to additional tax.

It is necessary to evaluate property taxation based on its contribution to income redistribution. Since capital accumulation is achieved through saving over long periods of time, in order to analyze the effects of property taxation, we need to focus on its long-term effects. The imposition of a property tax reduces after-tax property income, which leads to a decrease in asset accumulation and a subsequent decrease in asset income over the following period. To analyze the effects of property taxation, it is necessary to select research methods that can take into account the long-term nature of the property tax and asset accumulation.

Toward this end, we analyze the effect of property tax reform on macroeconomic variables and distribution indicators using the general equilibrium model. This analytical model integrates intergenerational transfer into a pure overlapping generation model. To analyze the long-term effects of tax reform, we analyze changes from the normal state which can be derived from the overlapping generation model. In addition, we improved the model by incorporating inheritance decision-making into a pure lifecycle model. Thus we can analyze the effects of the inheritance and gift tax, which is one of important property taxes.

2 Model and Equilibrium

The basic structure of the model is a general equilibrium overlapping generation model. This model integrates inheritance, which is a type of private transfer between generations, into the model of Jeon Young-joon et al. (2013), which assumes a pure lifecycle model. This model also considers the uncertainty of the economy, rather than assuming the standard perfect information. Uncertainty consists of macroeconomic uncertainties that cause volatility in the economy and individual idiosyncratic risk.

We use the value function iteration method employed by Hansen and Imrohoroglu (1992) and Heer (1999). Based on this, we derive the equilibrium value of the model in steady-state. The method used to calculate the steady-state equilibrium value is based on the method employed by Jeon Young-joon et al. (2013).

First, we select policy variables and set the initial values of economic variables affected by policy variables. Based on the initial values, the results of the decision-making of enterprises and households are obtained by backward induction. The population distribution is calculated as well. Using the results of the decision-making of enterprises and households and the population distribution, we derive new economic variables that satisfy the government budget constraints and the consistency of decision-making. Then until the values of the newly derived economic variables are not much different from the assumed

values in the previous step, the decision-making process of the economic agents, such as households, enterprises, and the government, is repeated to derive the equilibrium value.

3 Policy Simulation

For the simulation, we formulated five base economy/policy change scenarios ([1], [2], [3], [4], and [5]). The base economy has assumed that the progressive structure of the income and inheritance taxes is maintained as the current tax system. The capital income tax is assumed to be a proportional tax, based on the fact that the corporate tax, which accounts for a significant portion of the capital income tax, has a substantially proportional nature.

These scenarios assume the abolishment of the capital income tax (corporate income tax) ([1]), abolishment of the inheritance tax ([2]), and conversion of progressive personal income tax into proportional tax ([4]). Scenario [3] assumes the abolishment of both the capital income and inheritance taxes ([1] + [2]), while Scenario [5] assumes the abolishment of the capital income and inheritance taxes and simultaneous conversion of progressive personal income tax into proportional tax ([1] + [2] + [4]). These scenarios can be understood as representing the economic effects of the current capital income tax (corporate tax) and inheritance tax. The property-related taxes have different impacts by income class, and this analysis focuses on their effects on the macro-economy and income redistribution.

〈Table VI-1〉 Simulation Scenario

	Scenario	Remark
Base economy	Progressive income tax, proportional capital income tax, and progressive inheritance tax	The progressive taxation system assumes that the marginal tax rate is the natural logarithm of tax revenue.
[1]	Abolishment of capital gains tax	Transfer spending reduced as much as revenue loss from the abolishment of the capital income tax
[2]	Abolishment of inheritance tax	Transfer spending reduced as much as revenue loss from the abolishment of the inheritance tax
[3]	[1] + [2]	Transfer spending reduced as much as revenue loss from the abolishment of the capital income and inheritance taxes
[4]	Proportional income tax	—
[5]	[1] + [2] + [4]	Transfer spending reduced as much as revenue loss from the abolishment of the capital income and inheritance taxes

Source: Calculated by the author

〈Table VI-2〉 Base Economy Macroeconomic Variables

	Economic boom	Economic slump	Average	Volatility (%) ¹⁾
GDP	111.1	105.93,4	108,5	3,39
Capital	330,7	321,2	326,0	2,50
Labor	53,0	51,2	52,1	2,51
Consumption	87,5	85,6	86,6	1,54
Inheritance	6,95	6,78	6,86	1,74
Wage rate	1,26	1,24	1,25	0,88
Private investment rate (%)	23,6	20,3	21,9	10,65
Employment rate (%)	60,0	56,5	58,3	4,35
National pension benefit (%) ²⁾	8,57	8,99	8,78	3,99
Unemployment benefit (%) ²⁾	0,65	0,64	0,64	0,98
Basic livelihood security benefit (%) ²⁾	0,91	1,42	1,17	30,50
EITC (%)	0,26	0,22	0,24	13,01
National pension premium (%)	—	—	14,6	—
Unemployment insurance premium (%)	—	—	1,07	—

Note: 1) Standard deviation / average

2) Proportion of GDP

Source: Compiled by Author

According to the results, the proportional income tax and abolishment of the inheritance and capital income taxes generated significant improvement in the macroeconomic variables. By converting progressive income tax into proportional income tax, the GDP increased by more than 30%. Capital accumulation increased by 2.8% and 3.6% due to the abolishment of the capital income tax [1] and abolishment of the inheritance tax [2], respectively. As the relative capital cost has decreased, labor has been replaced by capital, resulting in a slight decrease in labor input, but the overall production level has increased. As for the employment rate by income class (based on lifetime income), the employment rate of high-income class fell slightly, while that of low-income class increased. Disposable income increased in the high-income group due to the abolishment of the capital income tax but decreased slightly in the low-income group. Despite the increase in the employment rate of the low-income group, the decrease in disposable income in the low-income group is attributed to the decrease in public transfer, which was caused by the decrease in tax revenue. Abolishing the inheritance tax was found to increase disposable income across all income class, the reason being that, although inheritance is concentrated among high-income class, the heirs and children of the heirs is relatively low-income class.

When Scenarios [4] and [5] are applied, the progressive income tax has the effect of hampering asset accumulation. If income tax is converted from proportional taxation to progressive taxation ([4] → base economy), asset accumulation decreases by about 39%, while labor input decreases by about 15%. Meanwhile, in Scenario [5], which assumes a progressive income tax, capital income tax, and inheritance tax for redistribution purposes, the phenomenon seen in Scenario [4] is reinforced.

〈Table VI-3〉 Results of Policy Simulation 1 (change in absolute level)

	GDP	Capital	Labor	Consumption	Inheritance	Wage rate	Investment	Employment rate	Public pension ¹⁾	Unemployment benefit ¹⁾	NBLS benefit ¹⁾	EITC ¹⁾	Tax	Tax (trillion KRW)
Base economy	108.49	325.96	52.10	86.57	6.86	1.25	21.93	58.25	8.78	0.64	1.17	0.24	12.15	172.48
[1]	109.50	334.94	51.96	86.46	6.93	1.26	23.04	58.13	9.01	0.63	1.44	0.22	10.95	155.43
[2]	109.62	337.79	51.76	86.99	9.66	1.27	22.63	58.19	9.02	0.62	1.43	0.22	11.92	169.13
[3]	110.73	347.31	51.67	86.97	9.80	1.29	23.76	58.24	9.03	0.62	1.43	0.22	10.75	152.61
[4]	143.76	515.84	61.33	124.98	8.45	1.41	18.78	66.78	8.08	0.55	1.12	0.37	16.10	228.55
[5]	145.71	539.17	60.90	125.05	12.93	1.44	20.65	66.48	8.12	0.58	1.13	0.37	14.15	200.82

Rate of Change (%)

	GDP	Capital	Labor	Consumption	Inheritance	Wage rate	Investment	Employment rate	Public pension	Unemployment benefit	NBLS benefit	EITC	Tax	—
[1]	0.93	2.75	-0.27	-0.12	0.92	1.20	5.09	-0.21	2.57	-1.85	23.11	-9.99	-9.88	—
[2]	1.04	3.63	-0.66	0.48	40.73	1.70	3.23	-0.11	2.78	-3.32	22.80	-9.60	-1.94	—
[3]	2.06	6.55	-0.83	0.46	42.74	2.91	8.37	-0.03	2.83	-4.16	22.16	-9.28	-11.52	—
[4]	32.51	58.25	17.72	44.37	23.15	12.56	-14.33	14.64	-8.03	-13.85	-3.56	54.54	32.51	—
[5]	34.30	65.41	16.89	44.45	88.46	14.90	-5.80	14.13	-7.50	-10.23	-3.11	54.23	16.43	—

Note: 1) Proportion of GDP (%)

[1] Abolishment of capital income tax, [2] abolishment of inheritance tax, [3] = [1] + [2], [4] proportional income tax system, [5] = [3] + [4]

Source: Compiled by the author

Table VI-4 Results of Policy Simulation (impact on volatility)

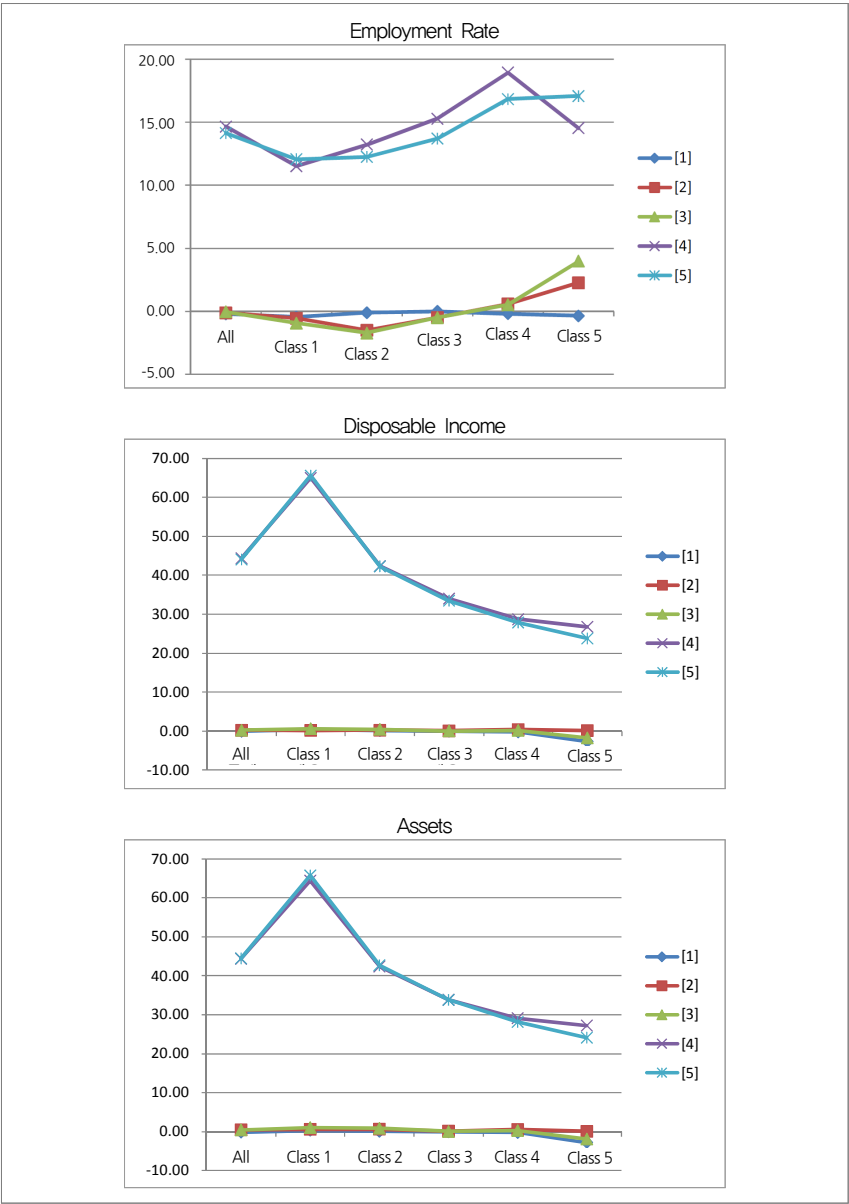
	GDP	Capital	Labor	Consumption	Inheritance	Wage rate	Investment	Employment rate	Public pension	Unemployment benefit	NBLS benefit	EITC
Base economy	3.39	2.05	2.51	1.54	1.74	0.88	10.65	4.35	3.39	0.98	30.50	13.01
[1]	3.38	2.12	2.45	1.56	1.76	0.93	10.21	4.31	3.30	0.46	25.05	14.34
[2]	3.29	1.90	2.46	1.50	2.18	0.84	10.18	4.43	3.22	0.59	25.40	15.17
[3]	3.23	1.77	2.44	1.52	2.16	0.79	9.50	4.47	3.16	0.30	25.95	15.45
[4]	2.37	1.03	1.50	1.68	1.34	0.87	6.97	3.79	2.33	15.66	26.11	12.51
[5]	2.45	1.05	1.62	1.79	1.86	0.83	6.44	3.95	2.41	15.14	26.70	13.06

Rate of Change (%)

	GDP	Capital	Labor	Consumption	Inheritance	Wage rate	Investment	Employment rate	Public pension	Unemployment benefit	NBLS benefit	EITC
[1]	-0.25	3.16	-2.28	0.82	1.22	5.56	-4.20	-1.05	-2.57	-53.01	-17.87	10.25
[2]	-2.73	-7.38	-2.12	-2.78	25.62	-4.47	-4.47	1.77	-4.94	-39.31	-16.74	16.62
[3]	-4.58	-13.72	-2.84	-1.81	24.35	-9.58	-10.81	2.64	-6.71	-69.72	-14.92	18.80
[4]	-30.00	-49.83	-40.35	8.64	-22.68	-0.44	-34.55	-12.91	-31.15	1501.72	-14.41	-3.80
[5]	-27.57	-48.66	-35.51	16.15	6.94	-4.89	-39.58	-9.26	-28.80	1448.32	-12.48	0.41

Note: [1] Abolishment of capital income tax, [2] abolishment of inheritance tax, [3] = [1] + [2], [4] converted to proportional income tax, [5] = [3] + [4]
Source: calculated by the author

[Figure VI-1] Impacts on Resource Distribution by Income Class (average effect)



Despite the negative effect on economic growth, the redistribution effect of a progressive property tax has been found. It increases disposable income of the low-income class and reduces disposable income of the high-income class, contributing to the improvement of the overall income distribution. During the economic slump, the increase in the Gini coefficient of scenario ([2] → base economy) was larger for disposable income than for the introduction of capital income tax ([1] → base economy) (0.310 → 0.294 vs. 0.307 → 0.306). And in the case of consumption, it was lower (0.264 → 0.264 vs. 0.275 → 0.274). The distribution of assets showed a relatively greater improvement (0.588 → 0.579 vs. 0.580 → 0.579) due to the introduction of the inheritance tax. The progressive income tax ([5] → base economy) also led to a significant improvement in income distribution regardless of the economic conditions, from 0.310 (0.368) to 0.294 (0.306) for disposable income, from 0.644 (0.643) to 0.583 (0.579) for assets, and from 0.317 (0.326) to 0.264 (0.274) for consumption. The degree of improvement was higher than that generated by the inheritance tax.

〈Table VI-5〉 Changes of Gini Coefficient by economic cycle

		Disposable income	Assets	Consumption
Base economy	Economic boom	0,294	0,583	0,264
	Economic slump	0,306	0,579	0,274
Abolishment of capital income tax	Economic boom	0,297	0,583	0,267
	Economic slump	0,310	0,580	0,278
Abolishment of inheritance tax	Economic boom	0,310	0,590	0,264
	Economic slump	0,307	0,588	0,275
Capital income tax + inheritance tax	Economic boom	0,296	0,591	0,267
	Economic slump	0,310	0,588	0,278
Conversion to proportional income tax	Economic boom	0,310	0,648	0,317
	Economic slump	0,368	0,646	0,326
Capital income tax + inheritance tax + conversion to proportional income tax	Economic boom	0,359	0,644	0,321
	Economic slump	0,373	0,643	0,331

Source: calculated by the author

In order to evaluate the impact of property taxation, we examined the effect of redistribution per KRW 1 trillion (unit amount). Imposing the capital income tax ([1] → base economy) and inheritance tax ([2] → base economy), which are options of strengthening property taxation, improves income distribution thanks to public transfer effects generated by the tax revenue secured. This improvement in income distribution was greater during the economic slump than the economic boom period. Furthermore it can be seen that applying both policies (capital income tax and inheritance tax) contributes to the improvement of income redistribution by securing tax revenue. It also makes a significant contribution to the improvement of disposable income distribution and more equal distribution of assets and consumption.

Strengthening progressivity of income tax has the greatest redistribution effect, but it reduces tax revenue by reducing tax bases, such as capital and labor. The improvement of the Gini coefficient per KRW 1 trillion revenue decrease ranges from 0.0011 (economic boom) to 0.0013 (economic slump), which is the highest effect except for the abolishment of the inheritance tax (0.0040) during an economic slump. This shows that the implementation of a progressive income tax is the most effective in terms of income redistribution, and that the inheritance tax is next alternative which is more effective than a capital income tax.

〈Table VI-6〉 Change in Gini Coefficient per KRW 1 Trillion of Revenue by Scenario

		Disposable income	Assets	Consumption
Basic economy (Gini coefficient)	Economic boom	0.294	0.583	0.264
	Economic slump	0.306	0.579	0.274
Abolishment of capital income tax [1]	Economic boom	-0.0002	0.0000	-0.0002
	Economic slump	-0.0009	0.0002	-0.0001
Abolishment of inheritance tax [2]	Economic boom	0.0002	-0.0021	-0.0001
	Economic slump	-0.0040	-0.0015	-0.0036
[3]=[1]+[2]	Economic boom	-0.0001	-0.0004	-0.0001
	Economic slump	-0.0008	-0.0003	-0.0008
Income tax proportional tax [4]	Economic boom	0.0011	0.0012	0.0009
	Economic slump	0.0013	0.0011	0.0011
[5]=[3]+[4]	Economic boom	0.0023	0.0022	0.0021
	Economic slump	0.0027	0.0021	0.0023

Note: The change in Gini coefficient by scenario is: change in Gini coefficient / tax revenue change to basic economy (trillion KRW). A negative value means that tax revenue and the Gini coefficient are moving in opposite directions, which means that income redistribution is exacerbated if the system is abolished.

4

Conclusion

In this chapter, we analyzed the effects of property tax reform on macroeconomic variables and income distribution using the household overlapping general equilibrium model. Considering the long-term effects of property tax, we assumed a stationary economy.

Our analysis showed that the capital income, inheritance, and progressive income taxes all put on negative impacts on macroeconomic variables. Therefore, reducing the property tax is expected to facilitate capital accumulation and improve labor-related variables, such as employment. But the cost of those taxes is worsening income distribution because of skewed benefits structure.

In terms of the redistribution effect of the property tax, both the capital income tax and inheritance tax can be used as means to improve redistribution

effect and secure tax revenue. This effect is more significant during an economic slump. In terms of the redistribution improvement effect, the inheritance tax is superior to the capital income tax, and the implementation of both taxes can contribute to more equal distribution of assets and consumption as well as disposable income. However, since they hamper economic growth, the trade-off between growth and redistribution should be considered in policy decision.

VII

Harmonization of Financing and Redistribution in Corporate Income Tax

1 Background

Corporate income tax has traditionally been addressed in terms of growth. However, after the global economic crisis, the effects of corporate tax cuts have been limited to large corporations, while the benefits experienced by SMEs and low-income earners have been relatively small, raising a note of caution about such tax cuts. Tax reforms, such as an adjustment of the corporate tax rate, should take into account not only revenue or growth issues but also equity issues, such as income redistribution. In recent years, the role of taxes in enhancing the equity and reducing the gap between large enterprises and SMEs has been increasing rather than the competitiveness of corporations.

In this chapter, we focus on the theoretical basis of the financing function, the incidence structure by economic agents, and the income redistribution effect of corporate income tax. These are the main issues that have been raised in recent arguments on tax reform. We examine the effects when the corporate tax is used to finance welfare costs, on economic agents, such as shareholders (investors), consumers, and employees, from the perspective of general equilibrium.

2 Theoretical Background and Previous Studies

Corporate income tax, which is levied on corporations, acts as a tax on consumers of capital. This burden is then passed on to other economic agents through various stages under the overall system of production and consumption. Changes in the corporate tax rate lead to price changes in the commodity market and affect both consumers and producers' behaviors at the relevant market.

In the corporate sector, changes in the corporate tax rate lead to changes in the relative demand and supply of capital and labor in the factor markets, ultimately changing the wage rate and profits of corporations. A company's profits are reserved for dividend or reinvestment purposes. Changes in earnings that are not allocated to suppliers of capital are reflected in stock prices, resulting in a change in capital gains.

In addition, changes in corporate taxation influence the tax revenue and the excess burden of taxes, expressed as a Harberger triangle, which is a change in consumer and producer surpluses in the commodity or factor markets. Thus, as the corporate tax rate changes, commodity prices and production factor prices change as well, resulting in changes in economic efficiency and tax revenues.

The theoretical analysis of the corporate tax incidence began with Harberger's (1962) general equilibrium theory. Harberger (1962) interpreted and analyzed the effect of capital taxation on the corporate sector as a change in relative prices, assuming that capital and labor in the corporate and non-corporate sectors were the factors of production.

Ratti and Shome (1977), Baron and Forsythe (1981), Shoven and Whalley (1984), Parai (1988), and Parai and Choudhary (1992) extended the existing model in a more realistic manner. They extended the scope of analysis by introducing uncertainty, sub-division of the industrial sector, relaxed production technology assumptions, and imperfect labor mobility.

As for the analysis of Korea, Kim, Seung-Rae, Young Jun Chun, and Jin-Yeong Kim (2015) took the approach of harmonizing efficiency and equity, while Kim, Seung-Rae and Woocheol Kim (2016) analyzed the effect of the 3%p cut in the corporate tax rate during the Lee Myung-Bak administration.

3 Incidence and Redistribution Effect of Corporate Income Tax

For this analysis, we use the model of Kim, Seung-Rae (2006 and 2010) and Kim, Seung-Rae, Young Jun Chun, and Jin-Yeong Kim (2015), who analyzed in detail the incidence structure of the changes in corporate tax rate and the welfare changes of consumers by income class using a Harberger-Shoven-Whalley-type general equilibrium system. The reason this general equilibrium analysis is necessary is that the ripple effects of the increase of the corporate tax are spreading widely across the economy, including to consumers, employees, shareholders, and the government.

We assume 3%p increase of corporate tax rate for tax base exceed KRW 50 billion. The increase in tax revenue and efficiency cost of the economy due to 3%p increase in the corporate tax rate come through reductions of the consumer surplus and producer surplus. The total reduction in the consumer surplus and producer surplus due to the change in the corporate tax rate is estimated to be KRW 4.14 trillion. Specifically, the consumer surplus decreases by KRW 0.72 trillion, while the producer surplus decreases by KRW 3.42 trillion, indicating that the effect of the increase in the corporate tax rate is mostly attributed to producers, rather than consumers, on an annual basis. The increase in tax revenue due to the 3%p increase in the corporate tax rate is KRW 3.69 trillion, and the efficiency costs due to the increase is KRW 0.45 trillion. The change in producer surplus is again attributed to changes of KRW 0.36 trillion in labor and KRW 3.06 trillion in capital. In other words, 8.7% of the KRW 3.42 trillion decreases in the producer surplus is attributed to labor and 73.9% is attributed to capital, showing that the incidence of the corporate tax increase is largely attributed to capital.

〈Table VII-1〉 Incidence by Economic Sector with a 3%p Increase in Corporate Tax Rate

Total 4.14 (100)	Efficiency reduction 0.45 (10.9)	Consumption 0.72 (17.4)	Consumption 0.72 (17.4)		Consumption 0.72 (17.4)	Consumption 0.72 (17.4)
	Increase in tax revenue 3.69 (89.1)	Production 3.42 (82.6)	Labor 0.36 (8.7)		Labor 0.36 (8.7)	Labor 0.36 (8.7)
			Capital 3.06 (73.9)		Dividend 0.61 (14.8)	Majority shareholders 1.26 (30.3)
						Minority shareholders 1.32 (31.9)
					Reserve 2.45 (59.1)	Other shareholders 0.48 (11.7)

Note: The figures in parentheses represent share (%), and dividend payout ratio is assumed to be 20%. Efficiency is the sum of the weighted average of welfare changes by class.

Source: Figure IV-6 of Kim, Seung-Rae (2006), modified, extended, and recalculated using the latest data

Specifically, KRW 0.36 trillion, which is the burden of a 3%p increase in the corporate tax rate attributed to labor, is concentrated among small firms with high labor costs. On the other hand, KRW 3.06 trillion, which is the burden of a 3%p increase in the corporate tax rate attributed to capital, is concentrated among large firms with large operating surpluses.

〈Table VII-2〉 Incidence of 3%p Increase in Corporate Tax Rate by Corporation Size (based on 2015)

(Unit: trillion KRW)

Category			Less than KRW 1 billion	Up to KRW 10 billion	Up to KRW 100 billion	Up to KRW 1 trillion	More than KRW 1 trillion
Data of Korea Investors Service Inc.	Sales		0.7	25.0	423.5	442.3	1,970.8
	Labor cost (ratio)		0.28	3.25	26.38	19.04	55.62
			42.05%	13.00%	6.23%	4.31%	2.82%
	Operating surplus (ratio)		0.001	0.44	19.84	24.68	96.21
			0%	2%	4.68%	5.58%	4.88%
Statistics on national tax	Sales		62.8	311.7	708.8	1,210.5	1,201.8
	Labor cost		26.4	40.5	44.2	52.2	33.9
	Attributed to labor (ratio)		0.048	0.074	0.081	0.095	0.062
			0.077%	0.024%	0.011%	0.008%	0.005%
	Operating surplus		0.0	6.2	33.2	67.5	58.6
	Attributed to capital (ratio)		0.0	0.115	0.613	1.248	1.084
			0.000%	0.037%	0.086%	0.103%	0.090%
Financial statements of listed companies	Sales		0.0	0.6	39.1	211.5	1,161.4
	Shareholding ratio	Majority shareholder	33.53%	33.41%	36.54%	43.09%	41.83%
		Minority shareholder	43.90%	50.58%	50.03%	41.61%	40.45%
		Others	22.57%	16.02%	13.43%	15.29%	17.72%
Incidence (trill. KRW)	Majority shareholder		0.0	0.038	0.224	0.538	0.453
	Minority shareholder		0.0	0.058	0.307	0.519	0.438
	Others		0.0	0.018	0.082	0.191	0.192

Note: 1. In the case of less than KRW 1 billion, the business surplus is negative and processed as "0."

2. Sales, labor cost, and operating surplus are totals of all corporations, and the ratio of each of these items is the ratio to sales.

3. Labor cost and operating surplus ratio are calculated based on the data of the Korea Investors Service and then applied to sales based on the national tax statistics to estimate labor cost and operating surplus by corporation size and proportionally distribute the portions attributed to labor and capital (KRW 0.36 trillion and KRW 3.06 trillion, respectively).

4. The share ratio is based on the 2016 share ratio data of listed companies, and the stake ratios of majority and minority stakeholders are calculated as of December 31, 2016

Source: Table IV-1 of Kim, Seung-Rae (2006), modified, extended, and recalculated using the latest data

The change in the Gini coefficient caused by a 3%p increase in the corporate tax rate is -0.0723%, based on 2015 income. The quintile multiple index decreases by merely 0.0082%. On the other hand, in terms of the redistribution effectiveness, the change in the Gini coefficient per KRW 1 trillion of tax revenue¹⁰⁾ is 0.0196% (or an improvement of 0.0000075), and the change in the quintile multiple is 0.0012% (or an improvement of 0.0002), both of which are much smaller than those of other tax items.

〈Table VII-3〉 Incidence of 3%p Increase in Corporate Tax Rate by Income Class
(based on 2015)

(Unit: KRW 1,000)

Category		1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	6th quintile	7th quintile	8th quintile	9th quintile	10th quintile
Ordinary income		5,333	11,723	18,616	25,871	33,024	40,228	47,821	56,795	69,875	105,673
Wage income		569	3,055	8,661	13,829	19,280	25,330	30,800	37,522	50,034	78,611
Non-wage income		4,764	8,668	9,955	12,042	13,744	14,898	17,021	19,274	19,842	27,063
Incidence of tax burden	Absolute amount	35	62	79	105	135	159	191	250	342	675
	Income share	0.66%	0.53%	0.42%	0.41%	0.41%	0.39%	0.40%	0.44%	0.49%	0.64%
	Relative ratio	0.17	0.31	0.39	0.52	0.67	0.78	0.94	1.23	1.68	3.32
	Gini coefficient	△0.0723% (0.379331 before increase → 0.379056 after increase)									
	Quintile multiple	△0.0082% (10.2921 before increase → 10.2913 after increase)									

Note: "incidence" refers to the welfare loss of each class. The "income share" of the incidence of tax burden is based on ordinary income. "Relative ratio" is the ratio of the incidence of tax burden of each income class to the incidence of tax burden of all class. The Gini coefficient is based on ordinary income, and the quintile multiple is the average income of the highest 20% households to the average income of the lowest 20% households.

Source: author

10) The change of indicators is divided by total revenue, 3.69 trillion KRW.

On the other hand, marginal efficiency cost (MEC) of corporate income tax is 29.8% of the tax revenue as of 2004, according to Kim Seung-rae and Kim Woo-chul (2007). In addition, the efficiency cost of the corporate tax is relatively large compared to that of personal income tax or VAT. Specifically, the marginal efficiency cost per increase of KRW 1 trillion in corporate income tax is 1.92 times that of VAT and 1.40 times that of personal income tax ($= 1.92 / 1.37$). This shows that raising the corporate tax rate is not a cost-effective means of securing revenue or improving income redistribution.

〈Table VII-4〉 Estimates of Marginal Efficiency Costs for Major Tax

	Corporate tax	Income tax	Value-added tax
MEC (efficiency multiplier) ¹⁾	0.298	0.212	0.155
Efficiency cost of KRW 1 trillion tax increase	KRW 0.298 trillion	KRW 0.212 trillion	KRW 0.155 trillion
Relative size (VAT = 1)	1.92	1.37	1

Note: 1) MEC (marginal efficiency cost of tax or marginal excess burden) refers to the social cost generated per unit of tax collection. It assumes that the average efficiency cost and marginal efficiency cost for each tax are the same. Corporate tax, income tax, and value-added tax were quoted from Kim Seung-rae and Kim Woo-cheol (2007)'s capital taxation, labor taxation, and consumption taxation.

Source: Based on Kim, Seung-Rae and Woocheol Kim (2007)

4

Conclusions

Since financing by increasing corporate income tax affects both the factor markets and the commodity markets from the perspective of general equilibrium, the tax burden is spread widely across the economy, including consumers, employees, shareholders, and governments.

According to the analysis based on the general equilibrium model, the redistributive effects of the corporate tax by income class are rather small, and the effect is widely spread across the economy, such as large shareholders, small shareholders, workers, and consumers. The Gini coefficient, which measures income inequality generated by a 3%p increase in the corporate tax rate,

decreased by 0.0723%, and the quintile multiple decreased by 0.0082%, based on 2015 ordinary income, showing a slight improvement in income distribution. The redistribution effect generated by the change in the Gini coefficient per KRW 1 trillion of tax revenue is quite small, recording 0.0196% (or an improvement of 0.0000075), with the quintile multiple changing by 0.0022% (or an improvement of 0.0002). If the priority of the government's tax policy is to improve income distribution, the cost-effectiveness of the corporate tax in this regard is low.

VIII

Conclusion and Policy Suggestions

As Korea is experiencing population aging and low economic growth after having enjoyed a period of rapid growth, welfare demand is increasing in a variety of areas. The country's entry into a low-growth period, where the unemployment rate is increasing, the income gap is widening, and revenue elasticity is decreasing, requires the active response of the government. Specifically, the widening of the income gap will increase the demand for government intervention, and the falling tax revenue shows that more efforts are needed to facilitate active financing and efficiency improvement. In this study, we examined how the financing and redistribution effects of tax policy can be effectively pursued during this low-growth period.

First, in the case of major industrialized countries, the decline in the potential growth rate is closely related to the decline in the growth rate of the working age population (or total population). Unlike in developed countries, Korea, since it has relatively low income and social welfare levels, needs to actively respond to its declining potential growth rate. It is thus necessary to evaluate various policy options, such as improving labor and capital quality and securing growth engines through innovation, as well as the role of the government.

The country's rapidly aging population is an obstacle to growth, as it increases the income disparity due to the increase in the elderly population, who has low income and growth rate, and restricts increases in labor input. Therefore, the tax policy should prioritize redistributive effects, but the main role should be played by fiscal expenditure targeting the low-income class. The problem of regressivity that can arise in the financing process can be solved

by spending policy with a greater income redistribution effect.

The analysis of the effects of tax and subsidy policies on income distribution in major industrialized countries shows that total tax revenue as a percentage of the GDP and cash-based public social expenditure have a major influence. By policy type, it has been confirmed that expenditure is a more effective means of redistribution than taxation. This shows that a small distribution effect gap in the financing process may not be very important, because a considerable income redistribution effect can be attained if cash-based public social expenditure is increased with additional financing. In terms of redistribution effect, it is necessary to take an integrated approach toward taxation and fiscal policies. It is rather important to reduce efficiency cost of taxation.

In the analysis by tax, personal income tax, property tax, and corporate income tax, which are actively discussed as means of redistributive policy, were considered. This is because they are taxes that enable both securement of revenue and redistribution of income. The analysis showed that the redistribution effect of the personal income tax is the greatest, followed by the inheritance tax and capital income tax. Therefore, it is necessary to consider this result. Meanwhile, in the case of the corporate income tax, redistribution effect in the financing process is very weak, while the cost is the highest. Also, the redistribution effect of income and property taxation can be different depending on the economic situation. In standardizing the redistributive effect based on tax revenue, the effects of both income taxation and inheritance tax are high.

However, since the redistribution effect is greater in a recession than in an economic boom, it would be more effective to reinforce redistribution effect by strengthening property taxation during an economic slump. Meanwhile, strengthening the tax policy for income redistribution generate efficiency costs, such as a reduction in working incentive, showing that it is important to make efforts to increase the effectiveness of each policy in order to mitigate any negative impacts along with other growth policies.

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